ROYAL BOTANIC GARDENS, KEW.

BULLETIN

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MISCELLANEOUS INFORMATION.

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XIV.—THE FLORA OF NGAMILAND.

INTRODUCTION BY MAJOR E. J. LUGARD, D.S.O.

The herbarium specimens, which, at great expenditure of time and skill, Mr. N. E. Brown has so carefully determined, were collected by my brother (Sir F. Lugard) and myself in 1896, and by my wife and myself in 1897–8, in that part of the Bechuanaland Protectorate which is locally known as Ngamiland.

Mr. Brown's list sufficiently indicates the character of the vegetation, but I have been asked to write a prefatory notice describing the physical and general characteristics of this region, which is seldom visited by Europeans, since it is cut off by the long "thirsts" of the waterless Kalahari Desert from the civilized parts of South Africa.

PHYSICAL FEATURES.

Ngamiland may be defined as the country around Lake Ngami, or, from a political and administrative point of view, as the country controlled by the Chief of the Batawana, a small western offshoot of the Bamangwato; the latter is by far the largest of the Bechuana tribes, and is ruled by the famous Chief Khama. Under the former definition the boundaries of Ngamiland are indefinite; but the Batawana country—radiating from the Chief's capital near Lake Ngami, and stretching into the Kalahari Desert to the south and east—was defined by Proclamation (No. 9 of 1899), after an Enquiry held by an Imperial Special Commissioner (Lt.-Col. Panzera, now Resident Commissioner of the Bechuanaland Protectorate), as being bounded on the north and west by German Territory, on the east by the meridian (about Long. 24° E.) passing through a beacon at Makalamabele on the Botletli River, and on the South by the 21st parallel of south latitude. The Batawana Native Reserve is in area some 38,000 square miles. It forms the most remote province of the Bechuanaland Protectorate administered by the Resident Commissioner whose headquarters are at Mafeking, 700 miles away

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across the Desert. The symbol of authority, the immediate controlling force on the spot, is the usual 'corporal's guard' in the form of some twenty Basuto police under two European officers with ten or twelve European N.C.O's. and troopers. The senior officer holds a Magistrate's commission.

Lake Ngami and the River-system.—Lake Ngami, the centre of which lies in about Lat. 20° 30′ S. and Long. 22° 50′ E., was first discovered by Livingstone and Oswell in 1849. At that time it was "a fine-looking sheet of water" some 20 miles long and 10 wide, and the roar of its waves was said to resemble thunder! But during the past half century the process of desiccation* in this part of Africa, already apparent in Livingstone's day,† has proceeded so rapidly that Lake Ngami has ceased to be a lake, and is now practically dry. It has become a vast expanse of reeds growing on a treacherous bottom, impassable to man or beast. It is true that, in years of exceptional rainfall in the countries to the north, the depression still fills up for a few months with the water brought down by the Okavango and Tamalakan Rivers. This occurred in 1899, when I last saw the Lake, but I am told the water gradually disappeared, and the Lake has not filled again. Water may at any time be found in the Lake bed at a depth of some 20 feet, but it is brackish and unpalatable.

Broadly speaking, Lake Ngami may be considered the northern limit of the Kalahari Desert, and the southern and lowest point to the S.W. of an inland river-system which finds no exit to the sea. The drainage, therefore, is towards this depression to the S.W., and towards the Makarikari Salt-pan which is at a still lower level some two hundred miles to the S.E. Lake Ngami is now in the intermediate stage between a lake and a salt-pan, of which latter there are many in the Kalahari Desert to the east. The altitude of the Lake is about 2,500 feet above sea-level. Space does not admit of more than a slight reference to the remarkable river-system of the country lying immediately north of Lake Ngami. It consists of a network of rivers and reed-grown swamps, of which the Tamalakan and the lower reaches of the Okavango are the extreme east and west channels. They are essentially the same river, linked up by innumerable channels "so many no one can tell their number," as Livingstone was told. This river-system has its rise in the countries of heavier rainfall to the north, and it empties itself either into the depression of Lake Ngami, or into the Botletli River (as the lower reaches of the Tamalakan are called) which ultimately loses itself in the sands of the Desert. No water can now enter the Lake from the north-west, as the channels have become completely silted up, but, in years of exceptional rainfall in the countries to the north, the flood brought down by the Tamalakan will fill up the channel of the Botletli to the south-east and a narrow arm of the Lake (called the "Lake River") linking up the Lake to the south-west. We may then have the phenomenon of a river dividing and flowing two ways, as mentioned by Livingstone ;‡

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* Vide *Die Kalahari* by Dr. S. Passarge, Berlin, 1904.
† *Vide* Livingstone's *Travels in South Africa*, page 66.
‡ *Vide* Livingstone's *Travels in South Africa*, page 67.

this, I am told, actually occurred in 1899. The annual rise of this river-system is, therefore, in no way dependent on the local rainfall (which is very limited), and occurs in the middle of the driest season of the year, flooding large areas of country. The Botletli River, where it has become a dry channel with occasional pools, mysteriously rises by subterraneous percolation before the flood reaches it.

The Kalahari Desert.—The Kalahari Desert which stretches away to the south and east of this river-system is a desert only by reason of an entire absence of surface water during the greater part of the year. So far as vegetation is concerned, it is in no sense a desert; although it is a dry place where no water is, it is covered with trees and bushes and a luxuriant growth of sweet grasses. The Northern Kalahari consists for the most part of level plains, at an altitude of nearly 3,000 feet above sea-level, of light sandy soil, varied at times by undulating sand-dunes. There is very little outcrop of rock; walls of limestone appear in places along the banks of the Botletli River and along what was formerly the south shore of the Lake; and occasionally low kopjes rise out of the plain, notably in the case of the Kwebe Hills, some 20 miles south of the Lake, to which fuller reference is made later. The sole supply of water in the dry season, which lasts some eight months of the year, is from Bushmen's pits, which only occur at great intervals on certain recognized routes; the trek over the intermediate country—mostly heavy sand—involves the formidable "thirsts," which are held in so much dread alike by whiteman and black. The worst "thirsts" (viz. treks between water-pits) of "the Great Thirstland" are, however, found in the Southern Kalahari Desert. The water-pits tap the catchment areas in a limestone formation, or more often in a sandstone formation with perhaps a surface stratum of limestone.* They vary in form and daily yield from a semi-open pit capable of yielding sufficient water for one or more spans of oxen maddened by the previous "thirst," to a Bushmen's sucking-pit where each drop is obtained only through a suction reed, and a white traveller is grateful for it secondhand from the mouth of a naked savage!† Needless to say this waterless country is practically uninhabited by man, while the larger mammals, such as the giraffe, eland, gemsbuck and other antelope, either travel very great distances to water, or sustain themselves during the dry season on the desert water-melons (*Citrullus vulgaris*) and succulent roots. Even the melons are very local and uncertain, and for many months of the long, dry African winter, when there is no dew in the Desert, the wild game gets no water whatever. Even the local breed of domestic sheep and goats can exist for months without water, and still retain condition.

The few humans that are found in the heart of the Desert are the so-called Bushmen. The dwarf Bushmen, the true aborigines of this country, are practically extinct or are only found far to the south. As Dr. S. Schönland said in his paper before the South

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* *Vide* Paper read by Dr. S. Passarge at the Berlin Geographical Society, April, 1899.

† *Vide* Livingstone's *Travels in South Africa*, page 51.

African Association, 1904, the Bushmen of the Kalahari are probably distinct from the Drakensburg Bushmen; this was also the view of Mr. A. A. Anderson. In the Northern Kalahari the Bushmen undoubtedly have a large admixture of other blood, and are much taller. Various weaker tribes have in the past been pressed back on the Desert by their more powerful neighbours, and are now in a state of serfdom; these are collectively known as Bakalahari. The Bushmen near Lake Ngami, however, have little or no Bantu blood, and are of a very low type; they speak with the click, and their language is almost impossible for a European to acquire. Both sexes wear the minimum of clothing. They are entirely nomadic in their habits; they never build any kind of hut, seldom even a shelter of branches, and they never cultivate the soil. They obtain fire by the friction of one stick working in the hollow of another. They subsist on succulent roots and on game and other animals shot with their poisoned arrows; they are unsurpassed as trackers. They draw from the desert-pits their supply of water, which they will carry to great distances in ostrich egg-shells; their need of water is slight. No game shot in the Desert is ever wasted; the Bushman, like the vulture, is hovering somewhere on the horizon, and as mysteriously appears at the death. His lean starved dog is fortunate if even a remnant of offal is available for him.

Near the Lake the Batawana dwell. The origin of the tribe was as follows:—"About 100 years ago, the younger brother of the then Chief of the Bamangwato separated from them with his followers. His name was Tawana (young lion), and he went—or was driven—to Lake Ngami, where he subdued the Makoba and other tribes. He then settled down there, ruling his followers, called after his own name the Ba-tawana (people of Tawana), and the various tribes which he subdued about Lake Ngami and along the Okavango River."*

The present Chief, Mathibi, was installed by Government as the rightful heir in 1906, when Sekgoma was deposed and deported to avoid tribal war. The Chief's town, Tsau, lies some 30 miles north-west of the Lake, on one of the channels of the Okavango. The Batawana are, as I have said, an offshoot of the Bamangwato, one of the Bechuana tribes, a Bantu race of the same stock as, but far inferior to, the Zulu. Numerically the Batawana are not strong—they probably do not exceed 1,500. They are, however, mostly well-mounted and well-armed, good hunters and good shots; like all the Bechuana tribes, they are most jealous of their hunting rights. They are the ruling race of this region, and hold in subjection other tribes earlier established in the country, such as the Makoba, fisherfolk who live in small villages on the river. The Bakalahari and the Bushmen yield their tribute of skins to them as their overlords.

The principal crop cultivated is Indian corn or "mealies" and, to a lesser extent, "kaffir corn" (*Sorghum vulgare*); their agricultural methods are of the most primitive type—their only implement the typical hoe of Africa. "Sweet potatoes" and "monkey

* *Three Great African Chiefs*, page 5, by Rev. E. Lloyd.

nuts" are grown to a limited extent; tobacco is grown in some plenty. No fruit trees of any kind are cultivated, nor are there any indigenous fruits palatable to the European. The Batawana, like all the Bechuana tribes, were the owners of vast herds of long-horned cattle, until the rinderpest in 1896 caused such terrible devastation. However, I am informed there has been no recrudescence of rinderpest or other cattle disease, except a small outbreak of "lung-sickness" amongst imported cattle, which was stamped out by stringent measures, and herds of considerable size are reappearing in the land. They also have large herds of goats and fat-tailed sheep, the latter so admirably provided by nature with the means of facing the stress of "lean months." The Batawana possess a few horses, but unless 'salted' (*i.e.* recovered from 'horse-sickness') imported horses seldom survive. The tse-tse fly (*Glossina morsitans*), fatal to all domestic animals, was formerly troublesome in parts of the river area, but since the extinction of the wild buffalo in these parts by the rinderpest in 1896, it has now completely disappeared.* I myself, however, caught many tse-tse flies on the Chobi in 1899, where there were then no buffalo.

Climate.

There are two well-defined seasons, the rainy season and the dry. The latter, when rain is practically never known to fall, extends from April to the end of November. Just before the rains break the relative humidity of the air is very low, and wind and dust-storms are very prevalent; the temperature reaches its maximum, about 100° within the hut, and even the cold night—that great redeeming feature of Africa—sometimes fails. The rainy season usually commences with heavy thunderstorms. In no part of the world have I seen so great a transformation in so short a time as at the breaking of the rains in the Kalahari. Within a few days, the land, which was a study in khaki, apparently covered with lifeless sticks and dead herbage, bursts into dense foliage and flower, and "the desert blossoms as the rose." Within a day or two of the first heavy shower, thousands of lilies and other bulbous plants spring out of the sand; the grass, which had completely died down, springs up afresh, and millions of tiny seedlings of a great variety of annuals literally carpet the ground. Until the close of the rainy season at the end of March there is a constant succession of flowering plants. The rainfall is limited and irregular, in some years almost entirely failing, but its occurrence in summer and not in winter no doubt accounts for the comparative luxuriance of the vegetation. The coldest month is July, in the middle of the dry season, when I have registered on the Okavango River in Lat. 19° S. as many as nine degrees of frost at night. The country is healthy throughout the dry season, but malaria and "Blackwater Fever" of a particularly virulent type attack Europeans during the rains, especially in the depression of the Lake and the river area, where mosquitoes are a pest.

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* *Vide* Mr. Selous' paper in the *Journal of the African Society*, Jan., 1909.

Flora and Fauna.

When asked in 1896 by the authorities at Kew to make a collection of the flora of this country, we were told that it was practically a *terra incognita* to the botanist—a fact sufficiently demonstrated by our capture of no less than 92 new species out of a total of 373, and it still affords an immense field of exploration for the botanist. The specimens which have now been determined were, with a few exceptions, collected in and around the Kwebe Hills, which are situated some 20 miles south of Lake Ngami. The collection may be considered representative of this part of the Northern Kalahari Desert, and, with the exception of the grasses, it is fairly exhaustive. The flora of the river area differs to some extent. The Kwebe Hills are an isolated group of low, bush-clad kopjes of a porphyry formation with an occasional outcrop of barren quartz. The highest hill is some 600 feet above the level of the surrounding plain, which latter is at an elevation of nearly 3,000 feet above sea-level. The range is some 12 miles long in a N.E. to S.W. direction, but not more than 6 miles at its widest point. The kopjes are very rough and boulder-strewn, but the sand of the surrounding desert has penetrated into the group in the intersecting valleys. The range, which was formerly well supplied with springs, is now devoid of water save for two water-pits; these are situated in the centre of the hills in a shale and limestone formation, and still yield a fair supply. Formerly these hills were the headquarters of the Batawana, but with the drying-up of the wells they were forced to migrate with their herds of cattle to the river area. While in the surrounding plains we found practically no plant which did not grow in or around these hills, there were many species growing in the hills which were not found elsewhere. Although situated within the Tropics, the Northern Kalahari Desert, with its limited rainfall and its elevation of some 3,000 feet may be considered the northern limit of the sub-tropical flora of South Africa. There are no palm trees, with the exception of a few Borassus palms at the T'klakani water-pits and on the Botletli Flats. The trees are all deciduous, there is practically no evergreen in the Kalahari away from the rivers. The great majority of trees are of the Acacia family, of which the largest and most handsome is the *A. Giraffae*; we discovered three new species. The baobab (*Adansonia digitata*) grows in great numbers in the Kwebe Hills, and occurs less plentifully in other parts of the country. It does not here attain a greater girth than 50 to 60 feet. The "Machihara" tree (*Terminalia prunioides*), though of no great size, is of local value on account of its hardness. In the desert further to the east, the Mopani (*Copaifera Mopane*) covers large areas in places where the soil is less sandy. The only hardwood trees of large dimensions are confined to the river banks. Only on the banks of the Okavango is found the Kigelia (*Kigelia pinnata*) with its handsome claret flowers and quaint sausage-shaped fruit, which occurs throughout tropical Africa. The African mahogany (*Khaya* sp.) does not extend so far south; there are no cypress or other coniferous trees, and no rubber-yielding trees or "vines," all of which are found in the countries of heavier rainfall immediately to the north. In fact there would appear to be no valuable timber

in the country, nor would it be possible to export any such if it existed. A species of the cotton plant (*Gossypium Stocksii*, var.) is indigenous, but not cultivated. Of other fibre-yielding plants, a species of *Sansevieria*, one of which produces the "bowstring hemp" of commerce, is used locally by the natives for making their fishing-nets, it grows freely along the banks of the Tamalakan and Botletli Rivers, as also does the new aloe (*Aloe Lugardiana*, Baker) described in *Kew Bulletin*, 1901, p. 135. There are many indigenous species of the genus *Indigofera*. But plants of economic value would seem to be sparsely represented.

A feature of much of the vegetation is its thorny nature; apart from the many species of thorny acacias and "wait-a-bit" thorn bushes (*Zizyphus mucronata*), which form in places an almost impenetrable thicket with every kind of straight and backward thorn, many of the smaller plants bristle with thorns on stem and branch, even on leaf, or calyx or seed-pod. Of most of the smaller plants the flowers are inconspicuous both as regards size and colouring, but there are several beautiful flowering-shrubs, e.g. *Bauhinia macrantha*, *Rhigozum linifolium*, *Catophractes Alexandri*; lilies (*Crinum and Pancratium*) in countless thousands, of which the new species (*Crinum rhodanthum*, Baker)—described in Dyer's *Flora of Tropical Africa*, vol. vii, p. 397, and illustrated in the *Botanical Magazine* for June 1901—is of exceptionally brilliant colouring; and a large number of species of *Hibiscus* of great beauty. *Gloriosa superba* is only found on the river banks. Attention may also be called to several new species of the interesting "carrion plants of South Africa" (*Stapelia* sp.), and to the two new species of *Ceropegia*. There are few representatives of the Orchidaceæ, but one new species (*Habenaria Lugardii*, Rolfe)—described in Dyer's *Flora of Tropical Africa*, vol. vii, p. 228, and illustrated in the *Botanical Magazine* for October 1901—is very beautiful; only one epiphytic orchid was discovered, *Ansellia africana* or *A. nilotica* or an allied species, which, though common in both East and West Africa, had never before been found so far south.

The light soil supports many grasses, belonging mainly to the genera *Andropogon* and *Aristida* (Dr. Schönland before S. A. Association, 1904), well-suited for stock, and of the grasses mentioned in the following List most of them would probably be of value for pasture. It would seem that for pastoral purposes alone is the country valuable. Away from the river-area, in these waterless and uninhabitable stretches of the Kalahari Desert, as Mr. Selous remarked in his recent paper before the African Society, the giraffe and other big game will find a safe retreat for many years to come, and the country will furnish a useful game reserve. Unfortunately the Kalahari wastes also form an unassailable breeding-ground for locusts, whence vast flights invade the Colonies of South Africa. Despite the destruction by European and native hunters, the Desert still affords asylum for most of the species of big game once found in countless herds all over the plains of South Africa down to the Cape. Herds of eland, blue wildebeest, gemsbuck and hartebeest, besides giraffe, are still found in the heart of the Desert; while within reach of the river-area zebra, koodoo, waterbuck, roan, tsessebi, impala, springbuck, bushbuck, and reedbuck are

common. The sable antelope is rare so far west. The duiker and steinbuck are met with everywhere. Hippo and crocodile are in all the rivers. Near the Chobi, baboons are in enormous numbers; warthog and bushpig are also numerous. Bird-life in the heart of the Desert is very scarce, but near the river-area, or in the vicinity of the desert water-pits, are found thousands of guinea-fowl, francolin, partridge and sandgrouse. Geese, both the spur-winged and the beautiful little Madagascar goose (*Nettapus madagascariensis*), and duck are in plenty on the rivers. The ostrich and the bustards are found far from water. Of the carnivora, the lion and the leopard and the smaller cats are only found within a comparatively short distance of the rivers, but the wild dog (*Lycaon pictus*) hunts far into the Desert.

Concluding Remarks.

Inaccessible, the greater part uninhabited and uninhabitable, Ngamiland can never be "a whiteman's country." The only Europeans now in the country, besides Government Police, are about half-a-dozen traders, and a few Boers in the Ghanzi veldt (S.W. of the Lake), the surviving remnant of the experimental Boer settlement, who eke out a precarious existence by "transport-riding." There are no European missionaries now resident in the country. Hitherto, despite great efforts, there has been a complete failure to discover mineral wealth, and, except as a pastoral country, and that only within a reasonable distance of the river-area, it is at present difficult to see of what value the country can be. There are those, however, who hold that accumulated subterranean supplies of water exist in the Desert, which, if tapped, would convert the land into one of the most fertile regions. Some hold that the solution of the problem lies in artesian wells, and that the Kalahari Desert may yet support stock-farming on a very large scale. (Cf. Mr. J. F. Herbst's Report—Colonial Reports—Misc., No. 55, Oct. 1908, on the Southern Kalahari). The opening up of waters must rest with Government, who alone could face the cost of such an undertaking, which must always be most uncertain in results. Government has recently, in a small way, improved existing pits and opened others with fair success at the eastern end of the usual route across the Northern Kalahari from Palapye. But this route involves a journey of some 500 miles by ox-wagon from the railway to the Lake, half of which is across dreaded "thirsts," and the remainder along the Botletli Valley over terribly heavy sand in the dry season, and through a very malarious region during the rains. I understand it is in contemplation to open up a much shorter route to Ngamiland by the old hunter's track from Kanya (north of Mafeking), via Anderson's Vlei and Sebigo's post, reaching the Lake from the south. This would shorten the road by nearly 200 miles in distance, would avoid most of the heavy sand, and would be a far healthier route.

The possibilities of the Kalahari as a future stock-raising country depend entirely on success in opening up water-supplies. But, as regards the river area and adjacent country, there are possibilities for irrigation on a large scale. In this connection I

quote the last Official Report on the Bechuanaland Protectorate (Colonial Reports—Annual, No. 593 for 1907–8):—

"Irrigation at present is unknown and, so far as can be seen, will never be possible on a large scale except in that remote portion of the territory known as Ngamiland. There, a great river, the Okavango, flowing from the north, enters the Protectorate and gradually loses itself in marshes of vast extent. The annual volume of water which the Okavango carries is enormous, and to-day this element, so precious in South Africa, disappears in the middle of the sub-continent as completely as though it were discharged into the ocean. It is not too much to suppose that in the days to come the flow of the Okavango will be controlled, and that by a system of canals that region, to-day a desolate swamp, and many hundreds of square miles bordering upon it, may become land capable of the highest cultivation. Some day Ngamiland may be known as the Egypt of the South."

List of plants collected in Ngamiland and the northern part of the Kalahari Desert, chiefly in the neighbourhood of Kwebe and along the Botletle and Lake Rivers.

N. E. Brown.

This collection contains 320 Dicotyledons, 52 Monocotyledons and 2 Ferns, a total of 374 species, of which 92 are new. The general level of the region in which they were collected is 3,000 feet above sea-level, with hills rising a few hundred feet higher, since the highest elevation recorded on any of the labels is 3,600 feet. The specimens are all well selected, carefully preserved and mostly very complete, and are accompanied by valuable notes on the habit, colour of the flowers, &c. Mrs. Lugard also made a large series of very accurate coloured drawings with dissections, from which much aid has been obtained in preparing the following descriptions. From the notes on the labels the general composition of the Flora of the region appears to be somewhat as follows:—Trees about 29, varying from 15 to 40 feet in height; shrubs or bushes 44 or over; succulent plants about 15; annuals 58, but probably others that are not so indicated may belong to this group; thorny or prickly plants 17; climbing or twining plants about 30, besides many that scramble over bushes or rocks or creep on the ground; bulbs 20, and of Orchids only 2 were found. The remainder are mostly herbaceous perennials or shrublets. Most of the specimens are stated to flower during the rainy season, *i.e.* December to February, in March there is a very great and sudden decrease, only about one-fourth as many being recorded for that month as for each of the three preceding. In June about as many are recorded as for March, but during the remainder of the year only from 1 to 7 are noted as flowering in each month. Yellow is the predominating colour of the flowers, next in order come white, green, mauve, purple, cream, orange, pink, red, blue, greenish or greenish-white, magenta, claret and scarlet.

The new species and varieties contained in the collection which have already been published are indicated by a * and a reference to the place of publication is added.

Ranunculaceae.

Clematis brachiata, *Thunb.* var.
At Tsau, in Okavango Valley, 3,000 ft., *Lugard*, 229.

Nymphaeaceae.

Nymphaea stellata, *Willd.*
Botletle River, *Lugard*, 8; upper reaches of Botletle River, 3,000 ft., *Mrs. Lugard*, 7.
Flowers, some white, some mauve, some tinted with mauve.

Cruciferae.

Brassica Schimperi, *Boiss?*
Kwebe, in cultivated ground, flowers yellow, *Lugard*, 174.
The specimen collected by Capt. Lugard has the same small flowers as *B. Schimperi* (which was also collected in cultivated ground in Arabia and Abyssinia, by Schimper, Nos. 941 and 1099), and has similar fruit, but the leaves do not appear to have been quite so thick in substance and the stigma is not quite so large.

Capparidaceae.

Cleome hirta, *Oliv.*
Kwebe Hills, 3,300 ft., *Lugard*, 134, *Mrs. Lugard*, 130.
An erect annual 2–3 ft. high, with mauve or purple flowers. Whole plant sticky.

Cleome diandra, *Burch.*
Kwebe Hills, 3,300 ft., *Lugard*, 130, *Mrs. Lugard*, 191.
An annual 2–3 ft. high. Petals yellow, mauve at the base.

Cleome rubella, *Burch.*
Botletle Valley, *Lugard*, 189.
Flowers purple.

Cleome monophylla, *Linn.*
Kwebe, *Lugard*, 95.
Flowers whitish.

Gynandropsis pentaphylla, *D.C.*
Kwebe Hills, 3,300 ft., *Lugard*, 108, *Mrs. Lugard*, 75.
Annual, 2 ft. high, flowers white. Eaten by the Bushmen.

Maerua nervosa, *Oliv.* var. **flagellaris**, *Oliv.*
Kwebe Hills, *Lugard*, 135A.
Sepals and petals green, staminal-filaments greenish-white.

Maerua angolensis, *D C.* var.
Totin, near Lake Ngami, *Lugard*, 26, Kwebe Hills, 3,000–3,400 ft., *Mrs. Lugard*, 28.
An evergreen tree, 6 to 20 ft. high; flowers yellowish-brown and green.

Cadaba termitaria, *N. E. Br.*

Botletle River, *Lugard*, 2, at the foot of Kwebe Hills, 3,200 ft., *Lugard*, 71, *Mrs. Lugard*, 11.

A bush, growing to a height of 8 ft. Sepals green; nectary, gynophore and staminal-filaments red. Fruit green.

Boscia microphylla, *Oliv.*

Kwebe Hills and Kalahari, 3,000–3,500 ft., *Mrs. Lugard*, 27.

Evergreen tree of bushy nature; flowers green.

Capparis tomentosa, *Oliv.*

Lake River, *Lugard*, 18.

Grows as a creeper to a height of 20 ft. Flowers greenish-white; stamens reddish-brown, fruit dark red.

Violaceae.

Ionidium enneaspermum, *Vent.*

Kwebe Hills, 3,400 ft., *Lugard*, 106, *Mrs. Lugard*, 74.

Annual, flowers purple or crimson.

Polygalaceae.

Polygala abyssinica, *R. Br.* var?

Near Kwebe, *Lugard*, 84.

Flowers white.

Polygala ukambica, *Chodat.*

I am doubtful if this is specifically distinct from *P. Quartiniana*, A. Rich., as the very slight difference in the form of the auricle of the terminal lobe of the lateral or upper petals is scarcely more than one of variation. The figures of this species in Chodat's monograph are not correct.

Kwebe Hills, 3,400 ft., *Mrs. Lugard*, 100.

Plant growing to 1 ft. high. Lateral sepals at first pink, afterwards greenish, with a red margin. Very rare, only 3 plants found.

Portulaceae.

Portulaca kermesina, *N. E. Br. Herba* humilis, succulenta, perennis. *Caules* 10–15 cm. longi. *Folia* lineari-teretia, acuta, glabra, ad axillas longe pilosa. *Flores* terminales, 1·2 cm. diam., pulchre kermesini. *Petala* late elliptico-oblonga, acuta. *Stamina* 10. *Styli* 5.

A succulent perennial *herb*, with erect, glabrous stems 4–6 cm. high. *Leaves* alternate, $\frac{1}{3}$–$1\frac{1}{4}$ in. long, 1–$1\frac{1}{4}$ lin. thick, linear-terete, acute, fleshy, glabrous, with long white hairs in their axils. *Flowers* solitary, terminal, with an involucre of 5 long leaves. *Sepals* $\frac{1}{4}$ in. long, ovate, acute. *Petals* $\frac{1}{4}$ in. long, 2 lin. broad, elliptic-oblong, acute, bright carmine. *Stamens* 10; filaments carmine, anthers yellow. *Styles* 5, carmine.

Kwebe Hills, growing in loose sand, 3200 ft., *Mrs. Lugard*, 88.

Allied to *P. foliosa*, Ker, but distinguished by its red flowers and acute petals.

Talinum caffrum, *Eckl. & Zey.*

Kwebe Hills 3000–3500 ft., *Lugard*, 62, *Mrs. Lugard*, 60.

Flowers orange, opening towards evening only.

Talinum cuneifolium, *Willd.*
Botletle Valley, *Lugard*, 214.
Flowers bright magenta.

Talinum Arnotii, *Hook. f.*
Kwebe Hills, 3300 ft., *Lugard*, 109, *Mrs. Lugard*, 188.
A spreading plant with a tuberous rootstock, very succulent Flowers yellow.

Elatineae.

Bergia prostrata, *Schinz.*
B. pallidirosea, Gilg.
Botletle Valley, *Lugard*, 203. Rhodesia: at Shesheke on the Zambesi, *Kirk!* Angola: by the River Cunene, near Humba, 3600 ft. *Baum*, 98! German South-west Africa: at Orumbo on the White Nosob River, *Dinter*, 1336 (1335 ex. *Schinz*)!

Malvaceae.

Sida cordifolia, *Linn.*
Kwebe, *Lugard*, 235.

Sida rhombifolia, *Linn.*
Botletle Valley, *Lugard*, 192; Kwebe Hills, 3,200 ft., *Mrs. Lugard*, 167.
An erect perennial, growing to 2 ft. high. Flower pale orange.

Abutilon Lugardii, *Hochr. & Schinz.*
Kwebe Hills, 3,300 ft., *Lugard*, 148; *Mrs Lugard*, 171.
Plant 3–4 ft. high; leaves and calyx very viscid; flowers orange-yellow.

Abutilon fruticosum, *Guill. & Per.*
Kwebe Hills, *Mrs. Lugard*, 85.
An erect perennial, growing to 2 ft. high.

Pavonia macrophylla, *E. Mey.*
Kwebe Hills, 3,300 ft., *Lugard*, 138, *Mrs. Lugard*, 52, 66.
Perennial, 2–2½ ft. high; flowers lemon-yellow or orange.

Pavonia clathrata, *Mast.*
Kalahari Desert, near Malichwaë, *Lugard*, 231, between Kobis, and North Shaw Valley, *Baines!*

Hibiscus ternatus, *Mast.*
Kwebe Hills, 3,300 ft., *Lugard*, 115, *Mrs. Lugard*, 120.
Annual, growing to 1 ft. high; flowers yellow.

Hibiscus Trionum, *Linn.*
Botletle Valley, *Lugard*, 196.

Hibiscus caesius, *Garcke.*
Kwebe Hills, 3,300 ft., *Mrs. Lugard*, 118.
Plant growing to about 2 ft. high; flowers yellow, with a deep blood-red centre.

Hibiscus micranthus, *Linn.*
Kwebe Hills, 3400 ft., *Lugard*, 38, *Mrs. Lugard*, 50.
Plant 4–5 ft. high; flowers white, turning to pink when faded.

Hibiscus platycalyx, *Mast.*

Kwebe Hills 3,400 ft., *Lugard*, 147, *Mrs. Lugard*, 95.

A shrub 3–7 ft. high; the only shrubby *Hibiscus* of the locality; flowers yellow, with a dark chocolate-red centre.

Hibiscus dongolensis, *Del.*

Kwebe Hills, 3,300 ft., *Mrs. Lugard*, 113.

Plant 2½ ft. high; flowers yellow, with a dull claret-coloured centre.

Hibiscus rhabdospermus, *Garcke.*

Kwebe Hills, 3,300 ft., *Mrs. Lugard*, 215.

An erect annual growing to 3 ft high; flowers pale yellow, with a claret-coloured centre.

Hibiscus Schinzii, *Gürke.*

A form with rather stouter stems and larger and less lobed leaves, but I think it is only a more luxuriant specimen than usual. It is very similar to *H. physaloides*, Guill. & Per., but the lobes of the leaves are much less acuminate and there are no glands exuding carbonate of lime on the underside of the leaves, so characteristic of that species.

Kwebe Hills, 3,000 ft., *Mrs. Lugard*, 112.

Growing to 1½ ft. high, at first erect, then producing long side branches running on the ground; flowers yellow, with a blood-red centre.

Hibiscus Kirkii, *Mast.*

Kwebe Hills, 3,300 ft., *Mrs. Lugard*, 214.

An erect annual, growing to 3 ft. high, covered with adhesive prickly hairs; flowers deep lemon-yellow, with a blood-red centre.

Hibiscus diversifolius, *Jacq.*

Chobe River, 2,500 ft.? *Lugard*, 301.

A magnificent water-holyhock, growing erect to 12 ft. or more high in the main channel of the River Chobe, close to the bank. Flowers magenta?

Hibiscus cannabinus, *Linn.*

Kwebe Hills, 3,000 ft., *Mrs. Lugard*, 213.

An erect aunual, growing to 3 ft. high, found about swamps, very thorny; flowers pale yellow, with a rich claret-purple centre.

Fugosia digitata, *Pers.*

Kwebe Hills, 3,300 ft., *Mrs. Lugard*, 94.

A perennial, growing to 1 ft. high; flowers yellow, with a deep red centre having a fringe-like margin.

***Gossypium obtusifolium**, *Roxb.* var. **africana**, *Watt*, Wild and Cultivated Cotton Plants, p. 153, t. 23.

Kwebe Hills, 3,000 ft., *Mrs. Lugard*, 198.

A spreading bush, growing to 4 ft. high; flowers yellow, with a claret-coloured centre.

Sterculiaceae.

Melhania didyma, *Eckl. & Zey.*

Kwebe Hills, 3,400 ft., *Mrs. Lugard*, 123.

A dwarf bush, growing to 3 ft. high; flowers yellow.

Hermannia nyasica, *Baker*.
Okavango Valley, about 3,000 ft., *Lugard*, 236.
A bushy plant, growing to 4 ft. high; flowers pink.

Hermannia Lugardi, *N. E. Br.* *Herba* annua, erecta, brevissime glanduloso-pubescens. *Folia* petiolata, oblonga vel lineari-oblonga, subtruncata, breviter serrato-dentata, tenuiter stellato-pubescentia, *Pedicelli* 2·5 cm. longi, 1-flori. *Calyx* campanulatus; dentes deltoidei, acuminati. *Corolla* calyce subduplo longior, rosea.

An erect *annual*, 1–1¼ ft. high, loosely branching, shortly glandular-pubescent in all parts except the corolla, the glandular hairs on the leaves being very scattered. *Leaves* spreading, green; petiole 2½–6 lin. long; blade ¾–2¼ in. long, 2½–8 lin. broad, oblong or linear-oblong, subtruncate at the apex, more or less rounded at the base, shortly serrate-dentate, rather thinly stellate-pubescent on both sides. *Stipules* 1 lin. long, subulate. *Flowers* solitary in the axils of the uppermost leaves, forming a lax, terminal, leafy raceme. *Pedicels* 1 in. long, filiform, ebracteolate, jointed near the apex. *Calyx* campanulate, thinly glandular-pubescent; tube 1⅓–1½ lin. long; teeth 1¾ lin. long, deltoid, subulate-acuminate. *Corolla* about twice as long as the calyx, rosy-purple; petals 5½ lin. long, broadly obovate, obtuse, glabrous. *Stamens* 3½–3¾ lin. long, included, connivent; filaments broadly obovate, glabrous; anthers very acuminate, slightly hairy. *Capsule* subtruncate, shortly 10-horned, minutely pubescent.
Kwebe Hills, *Lugard*, 145, *Mrs. Lugard*, 125.
A very distinct species, which might, perhaps, be placed near *H. amabilis*, Marloth, from which it differs in its annual habit and leafy raceme.

Waltheria americana, *Linn.*
Kwebe Hills, 3,300 ft., *Lugard*, 142, *Mrs. Lugard*, 210.
Plant 1–2 ft. high; flowers yellow.

Tiliaceae.

Grewia villosa, *Willd.*
Kwebe Hills, 3,400 ft., *Lugard*, 46, *Mrs. Lugard*, 108.
Bush up to 4 ft. high; flowers russet or green; fruit reddish-brown.

Grewia salvifolia, *Heyne.*
Kwebe Hills, 3,300 ft., *Lugard*, 92B, *Mrs. Lugard*, 103.
Bush growing to 10 ft. high; flowers golden-yellow.

Grewia pilosa, *Lam.*
Kwebe Hills, 3,300 ft., *Mrs. Lugard*, 121.
Bush up to 10 ft. high; flowers golden-yellow.

Grewia grisea, *N. E. Br.* *Frutex* ramosus, ramulis fulvo-tomentosis. *Folia* breviter petiolata, oblonga, acuta, minute denticulata, utrinque cinereo-velutina. *Umbellae* axillares, 2–3-florae, velutino-tomentosae. *Sepala* lineari-oblonga, subacuta. *Petala* sepalis breviora, elliptico-oblonga, obtusa vel emarginata.

A branching *shrub* about 4 ft. high, the young shoots covered with a velvety fulvous tomentum, the older twigs becoming glabrous with a whitish bloom overlying a dark brown bark. *Leaves* spreading, with petioles 1–1½ lin. long, fulvous-tomentose;

blade about 2 in. long, 9–10 lin. broad, oblong, acute, rounded and slightly unequal at the base, denticulate with minute regular obtuse teeth, both sides covered with a close velvety greyish tomentum, but paler beneath; stipules 4–5 lin. long, ½–¾ lin. broad, linear-lanceolate, subulate-acuminate. *Umbels* 2–3-flowered. *Peduncle* 1½–3 lin. long, fulvous-velvety. *Pedicels* 1½–2 lin. long, greyish-velvety. *Buds* oblong, not constricted at the middle. *Sepals* 3½–4 lin. long, ¾ lin. broad, linear oblong, hooded at the subacute apex, greyish-velvety outside, glabrous within. *Petals* much shorter than the sepals, about 2½ lin. long, 1⅓ lin. broad, elliptic-oblong, obtuse or emarginate, with a large gland on the claw, yellow; gland surrounded by a tomentose border, which is free from the petal at the obtusely rounded apex. *Torus* not longer than the glands, about ½ lin. long, glabrous, fringed with hairs at the apex. *Stamens* glabrous. *Ovary* adpressed-hairy, 2-celled; style shortly exceeding the stamens; stigma much dilated, 5-lobed. *Fruit* not seen.

Kwebe, *Lugard*, 54.

Allied to *G. salvifolia*, Heyne, but distinguished by its acute or very acute (not obtuse) leaves, with a close velvety grey tomentum on the upper side, and more numerous primary veins.

Grewia kwebensis, *N. E. Br.* *Frutex* ramosus, ramulis griseo-tomentosis. *Folia* breviter petiolata, elliptico-oblonga, obtusa, minute denticulata, supra glabra, subtus cinereo-velutina. *Umbellae* axillares, pedunculatae, 2–3-florae. *Sepala* lineari-oblonga, subobtusa. *Petala* sepalis breviora, lineari-oblonga, apice emarginata.

A *bush* about 6 ft. high, the young branchlets covered with a greyish velvety tomentum. *Leaves* spreading; petiole 1½–2 lin. long, somewhat fulvous-velvety; blade 1–3 in. long, ¾–1¾ in. broad, elliptic or elliptic-oblong, obtuse, equal or slightly unequal at the base, minutely denticulate, glabrous above, with a close velvety whitish-grey tomentum beneath; stipules 3–5 lin. long, ⅓–½ lin. broad, linear-subulate. *Umbels* axillary, pedunculate, 2–3-flowered. *Peduncles* 6–8 lin. long, greyish-velvety. *Bracts* similar to the stipules, very deciduous. *Pedicels* 4–6 lin. long, greyish-velvety. *Buds* oblong, obtuse, not constricted at the middle. *Sepals* 5–5½ lin. long, 1 lin. broad, linear or linear-oblong, hooded at the subobtuse apex, greyish-velvety outside, glabrous within. *Petals* shorter than the sepals, about 3½ lin. long, 1 lin. broad, linear-oblong, emarginate at the apex, with a large hairy-margined gland on the claw, yellow. *Torus* about ½ lin. long, glabrous below, densely pubescent at the apex. *Stamens* glabrous. *Ovary* pubescent or subtomentose; style shortly exceeding the stamens, glabrous; stigma much dilated obscurely lobed. *Fruit* not seen.

Kwebe, *Lugard*, 92.

Allied to *G. salvifolia*, Heyne, but is readily distinguished by its larger leaves and flowers, and longer peduncles.

Grewia subspathulata, *N. E. Br.* *Frutex* ramosus, ramulis fulvo-tomentosis. *Folia* breviter petiolata, elliptico-oblonga, acuta, serrulata, supra pilis minutis stellatis velutina, subtus cinereo-velutina. *Umbellae* axillares, pedunculatae, 2–3-florae, velutinae. *Sepala* lineari-oblonga, subobtusa. *Petala* sepalis breviora, spathulato-obovata, apice emarginata.

A branching *shrub*; young branchlets and petioles covered with a fulvous velvety tomentum intermingled with tufts of longer hairs; older twigs glabrous, greyish. *Leaves* spreading; petiole 1½–2 lin. long; blade 1¼–2½ in. long, ¾–1¼ in. broad, elliptic-oblong, acute, rounded and slightly unequal at the base, somewhat irregularly serrulate on the margin; upper surface covered with a minute stellate pubescence, somewhat velvety to the touch; under surface with a very dense whitish-grey velvety tomentum; stipules 3½–4 lin. long, linear-subulate, velvety. *Umbels* axillary, pedunculate, 2–3-flowered, velvety like the branchlets. *Peduncles* solitary or 2–3 together, 3–7 lin. long. *Bracts* similar to the stipules, caducous. *Pedicels* 3 lin. long. *Buds* oblong, obtuse, not constricted at the middle. Sepals 5–5½ lin. long, 1–1½ lin. broad, linear-oblong, hooded at the obtuse apex, velvety outside, glabrous within. *Petals* shorter than the sepals, 3–4 lin. long, 1¼–1⅔ lin. broad, spathulate-obovate, emarginate at the apex, with a large, orbicular, hairy-margined gland on the claw. *Torus* 1 lin. long, glabrous below, densely pubescent at the apex. *Stamens* glabrous. *Ovary* tomentose; style slightly exceeding the stamens, glabrous; stigma much dilated, slightly lobed. *Fruit* not seen.

Kwebe, *Lugard*, 92*a*.

This species somewhat resembles *G. pilosa*, Lam., but is readily distinguished by the whitish-grey under-surface of the leaves. The stellate hairs on the upper side of the leaves, although forming a velvety surface, have distinct spaces between them, allowing the green surface to appear, and are not densely interwoven as in *G. grisea*, N. E. Br.

Grewia cordata, *N. E. Br.* *Frutex* ramosus, ramulis fulvo tomentosis. *Folia* breviter petiolata, ovato-cordata, acuta vel subobtusa, serrato-dentata, supra viridia, pilis fasciculatis sparsim pubescentia, subtus albido-velutina. *Umbellae* axillares, pedunculatae, 2–3-florae, fulvo-tomentosae. Sepala oblonga, subobtusa. *Petala* sepalis breviora, cuneato-oblonga, apice emarginata, lutea.

A *bush* growing to a height of 10 ft.; young branchlets covered with a dense and somewhat villose or shaggy fulvous tomentum, older twigs glabrous, greyish. *Leaves* very shortly petiolate, 1¼–2½ in. long, 1–1¾ in. broad, ovate-cordate, acute or subobtuse, serrate-dentate, with small, somewhat irregular teeth; upper surface green, with scattered fasciculate hairs; under surface with a close velvety whitish-grey tomentum, the nerves and petiole fulvous; stipules 3–4 lin. long, linear-lanceolate, acute, fulvous. *Umbels* axillary, solitary or in pairs, pedunculate, mostly 3-flowered, fulvous-tomentose, erect. *Peduncle* ½ in. long. *Bracts* similar to the stipules, caducous. *Pedicels* 2½–3 lin. long. *Buds* ellipsoid. Sepals 4 lin. long, 1½ lin. broad, oblong, slightly hooded at the subobtuse apex, yellow. *Petals* 2½–3 lin. long, ¾–1 lin. broad, cuneate-oblong, emarginate or obtusely bfiid at the apex, glabrous, yellow. *Stamens* glabrous, orange-yellow. *Ovary* villose-tomentose; style glabrous, exceeding the stamens; stigma dilated, lobed. *Fruit* hairy.

Kwebe Hills, 3,300 ft., *Mrs. Lugard*, 102.

Allied to *G. monticola*, Sond., but readily distinguished by its larger, cordate leaves, and different indumentum.

Grewia calycina, *N. E. Br.* *Frutex* ramosus. *Rami* pilis fasciculatis breviter villosi. *Folia* brevissime petiolata, elliptica, utrinque obtusa, crenulato-denticulata, utrinque pubescentia et viridia. *Umbellae* foliis oppositae, prope apices ramorum, pedunculatae, 2–3-florae, pilis fasciculatis molliter pubescentes. *Bracteae* subpalmatisectae. *Sepala* anguste lanceolata, acuta. *Petala* minima, ovata.

A "*scrub bush*," young branches shortly villous with fasciculate hairs. *Leaves* somewhat ascending; petiole about 1 lin. long; blade $\frac{3}{4}$–$1\frac{3}{4}$ in. long, $\frac{1}{2}$–$1\frac{1}{4}$ in. broad, elliptic, obtuse, and often broadly rounded at the apex, rounded at the base, crenulate, green and softly pubescent on both sides; stipules 2–3 lin. long; linear-filiform. *Umbels* subopposite the leaves, near the apex of the branches, erect, pedunculate, 2–3-flowered, softly pubescent with fasciculate hairs. *Peduncles* 3–4 lin. long. *Bracts* 3–4 lin. long, deeply divided into linear-filiform segments. *Pedicels* 3–4 lin. long. *Sepals* 7–8 lin. long, $1\frac{1}{2}$–2 lin. broad, narrowly lanceolate, acute, campanulately spreading, white inside, green and pubescent with fasciculate hairs on the outside. *Petals* very small, $1\frac{1}{2}$ lin. long, 1 lin. broad, ovate, furnished with a large orbicular gland with a pubescent border, that occupies the greater part. *Torus* about $1\frac{1}{4}$ lin. long, glabrous in the lower third, velvety-tomentose above. *Stamens* glabrous. *Ovary* densely covered with rather long hairs; style exceeding the stamens, glabrous; stigma dilated. *Fruit* not seen.

Botletle Valley, *Lugard*, 237.

Allied to *G. hispida*, Harv., differing in its divided bracts, minute petals, and other characters.

Triumfetta pentandra, *A. Rich.*

Kwebe Hills, 3,300 ft., *Mrs. Lugard*, 206.

An erect annual, growing to 18 in. high; flowers yellow.

Corchorus tridens, *Linn.*

Kwebe Hills, 3,300 ft., *Lugard*, 113; *Mrs. Lugard*, 209.

Plant up to 2 ft. high; flowers yellow.

Corchorus asplenifolius, *Burch.*

Kwebe Hills, 3,300 ft., *Lugard*, 118; *Mrs. Lugard*, 115.

A perennial up to 8 in. high; flowers yellow.

Malpighiaceae.

Sphedamnocarpus pruriens, *Pl.*

Northern Kalahari Desert; near Inkonani Pits, 3,000 ft., *Lugard*, 291.

A creeper or twiner; flowers bright yellow; fruit pinkish-green.

Triaspis hypericoides, *Burch.* var.

Kalahari Desert; at T'Klakane Pits, 2,500 ft., *Lugard*, 304.

Scrub-bush growing to 5 ft. high; flowers pinkish-purple; fruit with brown wings.

Zygophylleae.

Tribulus terrestris, *Linn.*

Kwebe Hills, 3,300 ft., *Lugard*, 105, 123; *Mrs. Lugard*, 117.

Annual, growing to 12 in. high (*Mrs. Lugard*), ground creeper (*Lugard*); flowers yellow.

Geraniaceae.

Monsonia biflora, *DC.* var.
Kwebe Hills, 3,300 ft., *Lugard*, 117 ; *Mrs. Lugard*, 69.
Dwarf perennial, 6 in. high ; flowers white.

Monsonia senegalensis, *Guill. & Per.*
Kwebe Hills, 3,300 ft., *Lugard*, 110, 153 ; *Mrs. Lugard*, 173.
A spreading annual ; flowers pink, with darker veins (*Mrs. Lugard*), purple (*Lugard*).

Burseraceae.

Commiphora kwebensis, *N. E. Br.* *Frutex* vel arbuscula inermis ; ramuli minute cinereo-velutini. *Folia* trifoliolata vel imparipinnata, 2-juga, petiolo 0·6–5 cm. longo ; foliola lateralia elliptica vel elliptico-oblonga, utrinque obtusissima, terminalia basi longe et acute cuneata, crenato-serratula, supra tenuissime et minutissime pubescentia, subtus in nervis minute pubescentia. *Flores* subfasciculati, parvi ; pedunculi 1–3-flori. *Drupa* ellipsoidea.

A spineless much branched *shrub* or *small tree*, 4–15 ft. high, dioecious. *Branches* widely divergent, minutely grey-velvety, becoming glabrous, with a dark brown bark. *Leaves* trifoliolate or pinnately 5-foliolate, when very young densely pubescent with minute hairs or softly villous with longer hairs on the petiole and both surfaces, when adult with a minute pubescence on the petioles and veins of the under surface and thinly scattered on the upper surface ; petiole of adult leaves (up to the terminal leaflet) $\frac{1}{4}$–2 in. long ; lateral leaflets $\frac{1}{4}$–1 in. long, 2–7 lin. broad, elliptic or elliptic-oblong, very obtuse at both ends, unequal-sided at the base, sessile ; terminal leaflet elliptic-obovate, obtuse, cuneately narrowed from a little below the middle to a very acute base, all finely crenate-serrulate, thin. *Male flowers* usually subfasciculate, with 1–3-flowered pubescent or shortly villous peduncles 1–3 lin. long, or occasionally one or more of the peduncles up to 8–10 lin. long ; bracts $\frac{3}{4}$–$1\frac{3}{4}$ lin. long, filiform, pubescent ; pedicels 1–$2\frac{1}{2}$ lin. long, pubescent or shortly villous ; calyx 2 lin. long, campanulate, tapering to the base, 4–5-lobed to nearly half way down, pubescent ; lobes deltoid-ovate, subacute, erect ; petals 4, perigynous, about $1\frac{1}{2}$ lin. long, $\frac{3}{4}$ lin. broad, oblong obtuse, glabrous, greenish-yellow ; stamens 8, perigynous, inserted with the petals at the margin of the disk which lines the calyx-tube almost to its top, unequal, the 4 longer alternating with the petals ; ovary none. *Female flowers* solitary, pedicels 1–$1\frac{1}{2}$ lin. long ; calyx $1\frac{1}{3}$ lin. long, campanulate, broad-based ; petals $1\frac{1}{3}$ lin. long, $\frac{1}{2}$ lin. broad ; stamens rudimentary, the longer $\frac{1}{3}$–$\frac{1}{2}$ lin. long ; disk very short, fleshy, 8-crenate ; ovary ovoid, narrowed into a very stout style $\frac{1}{4}$ lin. long ; stigma large, 2-lobed, otherwise as in the male. *Drupe* ellipsoid, 7 (in the dried state, 5) lin. long, 6 (in the dried state, 4) lin. in diam., bright red ; no aril-like body around the bony compressed endocarp.

Kwebe Hills, 3,400 ft., *Lugard*, 86 ; *Mrs. Lugard*, 34.

This species appears to be nearest allied to *C. Rehmanni*, Engl.

Mrs. Lugard notes that the male and female trees are separate, and that they start flowering before the leaves appear and continue

in flower long after the leaves develop. The trees flower in December and the fruit ripens in February.

Commiphora Lugardae, *N. E. Br.* *Arbor* usque 6 m. alta, spinescens. *Folia* simplicia vel 3-foliolata, obovata, serrata, glabra; foliola lateralia parva minima vel obsoleta. *Flores* masculi subcymoso-fasciculati, feminei subsessiles, rubescentes. *Drupa* globosa, rubra, mesocarpo arillum simulante coccineo in lobos 4 lineares diviso.

A thorny *tree* growing to a height of 20 ft., dioecious, flowering before the leaves appear, and exuding "quantities of soft pink and white gum, standing out in knobby balls." *Branchlets* ending in spines. *Leaves* fascicled, subsessile or very shortly petiolate, simple or trifoliolate; lateral leaflets, when present, 1–7 lin. long, $\frac{2}{3}$–5 lin. broad; middle leaflet 1–3 in. long, $\frac{1}{2}$–$1\frac{1}{2}$ in. broad; all obovate, cuneately much attenuated at the base, very broadly rounded at the apex, serrate in the upper part, quite glabrous. *Male flowers* subcymose-fasciculate. *Peduncle* $\frac{1}{2}$–2 lin. long, puberulous. *Pedicels* $\frac{1}{2}$–1 lin. long, puberulous. *Bracts* minute. *Calyx* $1\frac{1}{3}$-$1\frac{1}{2}$ lin. long, shortly 4-toothed, puberulous; teeth subobtuse. *Petals* $2\frac{1}{2}$ lin. long, $\frac{1}{2}$ lin. broad, linear, acute, erect, recurved at the apex, glabrous, reddish outside, greenish within. *Stamens* 8, biseriate, included, the alternate ones longer. *Disk* annular. *Female flowers* subsessile, fascicled, resembling the male flowers except that they are rather smaller, more ovoid and the petals are scarcely recurved at the apex; their stamens are abortive and about $\frac{1}{2}$ lin. long. *Ovary* ovoid, narrowed into a short style, glabrous, 2-celled; ovules 2 in each cell. *Drupe* globose, 4–5 lin. in diam., red when ripe; epicarp fleshy; mesocarp transformed into a bright red aril-like body with 4 linear-terete lobes embracing the bony globose endocarp.

Kwebe Hills, 3,000–3,500 ft., *Mrs. Lugard*, 23.

According to Mrs. Lugard's note, this is said to be a poisonous tree, and "as far as observed in the plains never attains to a greater size than scrub bush." Possibly the plant of the plains, which I have not seen, may be a different species.

Olacineae.

Ximenia americana, *Linn.*

Botletle River and Kwebe Hills, 3,000–3,300 ft., *Mrs. Lugard*, 3.

Thorny bush, up to 20 ft. high; flowers green; fruit 9–10 lin. in diam., bright yellow.

Ximenia caffra, *Sond.*

Kwebe Hills, 3,200 ft., *Mrs. Lugard*, 58.

A bush, up to 5 ft. high, slightly thorny; flowers white (owing to the very dense bearding of white hairs upon the green petals); fruit 13–15 lin. in diam., scarlet.

Celastraceae.

Hippocratea parviflora, *N. E. Br.* *Frutex* scandens. *Folia* lanceolata, obtusa, basi cuneato-angustata, obscure denticulata, supra tenuiter et minutissime puberula, subtus molliter pubescentia. *Cymae*

axillares, dichotome ramosae, multiflorae, pubescentes. *Flores* minuti, virides.

A climbing *shrub* with a greyish bark. *Leaves* opposite, 1½–2¾ in. long, 7–11 lin. broad, lanceolate, narrowed to an obtuse point and tapering at the base into a 2–3 lin. long petiole, obscurely denticulate, thinly and minutely puberulous on the upper side, softly pubescent beneath. *Cymes* from both axils, 1¼–2½ in. long and broad, dichotomously branched, many-flowered, pubescent. *Bracts* minute. *Pedicels* ½–1 lin. long. *Flowers* minute, green. *Sepals* ⅙ lin. long, obtuse, pubescent. *Petals* ⅔ lin. long, ¼ lin. broad, oblong, obtuse, glabrous. *Stamens* 3, white, ¼ lin. long. *Fruit* not seen.

Kwebe Hills, 3,300 ft., *Mrs. Lugard*, 180.

Rhamnaceae.

Zizyphus mucronata, *Willd.*

Kwebe, *Lugard*, 122 ; *Mrs. Lugard*, 31.

Tree, growing to 15 ft. high ; flowers green.

Berchemia discolor, *Hemsl.*

Kwebe Hills, 3,300 ft., *Mrs. Lugard*, 33.

Tree, growing to 30 ft. high ; flowers green.

Helinus mystacinus, *E. Mey.*

Kwebe Hills, 3,300 ft., *Lugard*, 157 ; *Mrs. Lugard*, 79.

A dwarf shrub or creeper ; flowers green.

Ampelideae.

Vitis congesta, *Baker*, var.

Kwebe Hills, 3,300 ft., *Lugard*, 187 ; *Mrs. Lugard*, 197.

Creeps much over rocks ; foliage succulent ; flowers green or greenish-white.

Sapindaceae.

Cardiospermum canescens, *Wall.*

Kwebe Hills, 3,400 ft., *Lugard*, 104 ; *Mrs. Lugard*, 122.

A creeper, flowers pale yellow according to Lugard, white with a deep yellow stigma according to Mrs. Lugard's drawing ; fruit green.

Anacardiaceae.

Rhus kwebensis, *N. E. Br.* *Frutex* usque 2·1 m. alta, dioica. *Folia* petiolata, trifoliolata, foliolo intermedio sessili ellipticooblongo obtuso basi cuneato-acuto grosse crenato, lateralibus duplo minoribus ellipticis basi obtusis vel rotundatis. *Paniculae* axillares et terminales, multiflorae, pubescentes.

A *bush*, growing to a height of 7 ft., dioecious. *Branchlets* greyish-tomentose. *Leaves* petiolate, trifoliolate, softly pubescent on both sides ; petiole 3–10 lin. long, tomentose ; middle leaflet sessile, 1–2¼ in. long, ⅔–1½ in. broad, elliptic-oblong, very obtuse, broadly cuneate at the acute base, coarsely crenate ; lateral leaflets similar but only half as large and somewhat obtuse or rounded at the base. *Panicles* axillary and terminal, many-flowered, pubescent. *Flowers* 1½ lin. in diam., green. *Sepals* ¼ lin. long and broad, rounded,

pubescent. *Petals* nearly $\frac{2}{3}$ lin. long, $\frac{1}{3}$ lin. broad, oblong, obtuse, glabrous. *Stamens* 5, inserted at the margin of the disk, rudimentary in the female flowers. *Ovary* inserted on a large disk, globose, glabrous.

Kwebe Hills, 3,300 ft., *Mrs. Lugard*, 200.

Allied to *R. Rehmanniana*, Engl., differing in its inconspicuously reticulated and coarsely crenate-toothed leaves and larger flowers.

Sclerocarya caffra, *Sond.*

Kwebe Hills, 3,300–3,500 ft., *Mrs. Lugard*, 38.

Trees, male and female, growing to 40 ft. high; flowers pink to maroon; fruit green, like a large plum, enclosing a hard three-eyed stone.

Leguminosae.

Crotalaria spartioides, *DC.*

Kalahari Desert; near Malichwae, *Lugard*, 232.

Plant, 3 ft. high, like "Broom;" flowers bright yellow.

Crotalaria incompta, *N. E. Br.* *Herba* minutissime pubescens, ramis angulatis. *Folia* simplicia, petiolata, lineari-lanceolata, acuta, supra glabra. *Racemi* laterales, 2–4 flori. *Corolla* lutea, glabra, carina acutissima.

A *herb*, 1–1½ ft. high, branching from the base upwards, very minutely and thinly pubescent with adpressed hairs, except on the corolla and upper surface of the leaves; branches more or less angular, erect. *Leaves* rather distant, petiolate, simple; petiole 4–6 lin. long; blade 1–3½ in. long, 1½–4 lin. broad, linear-lanceolate or linear, acute, somewhat rounded at the base, glabrous above; stipules $\frac{2}{3}$–1 lin. long, subulate. *Racemes* lateral at the nodes, pedunculate, 4-flowered, shorter than the leaves, varying from 1–2½ in. long, of which one quarter to half the length is peduncle. *Bracts* $\frac{1}{2}$–$\frac{3}{4}$ lin. long, subulate. *Pedicels* 2 lin. long. *Calyx-tube* about $\frac{3}{4}$ lin. long, broadly campanulate; teeth subequal, 1½ lin. long, narrowly elongated-deltoid, acute. *Corolla* glabrous, yellow, 3 lin. long; keel abruptly bent at a right angle at the middle, very acute.

Botletle Valley, *Lugard*, 205.

In foliage this species resembles *C. Vogelii*, Benth., but it is much more glabrous, and the lateral few-flowered racemes at once distinguish it.

Crotalaria flexuosa, *Baker.*

Kwebe Hills, 3,300 ft., *Lugard*, 133; *Mrs. Lugard*, 179.

Plant, 1–2 ft. high; flowers yellow.

Crotalaria platysepala, *Harv.*

Kwebe Hills, 3,200 ft., *Lugard*, 158; *Mrs. Lugard*, 178.

Okavango Valley, 3,000 ft., *Lugard*, 238; banks of the Tamalakane and Zouga Rivers, *McCabe*, 8; in sandy soil between the rivers beyond the Lake (Ngami) and also by the sides of the Rivers Chobe and Tamalakane, *McCabe*, 11.

An erect annual, 1½–3 ft. high; flowers bright yellow.

Indigofera daleoides, *Benth.*

Kwebe Hills, 3,300 ft., *Mrs. Lugard*, 194.

A spreading annual; flowers carmine.

Indigofera hirsuta, *Linn.* var.
Kwebe Hills, 3,400 ft., *Lugard*, 135*a*; *Mrs. Lugard*, 127.
An erect annual, growing to 14 in. high; flowers pink.

Indigofera flavicans, *Baker*. This species was originally described from a very fragmentary specimen, and its close resemblance to *I. diphylla*, Vent., has not hitherto been noticed. Although Mr. E. G. Baker in his monograph of the Tropical African species (*Journal of Botany* 1903, p. 191) states that it is "an ally of *I. diphylla*," yet he separates them widely in his arrangement of the species and includes some specimens of *I. flavicans* under *I. diphylla*, Vent. Indeed, the two species have hitherto been confused, but may easily be recognised by the following characters: — In *I. diphylla*, the racemes (either in flower or fruit) are not more than 1 inch long and are subsessile or with a very short peduncle, and the pods gradually taper into a stout beak-like style, which is as long as the seed-bearing part and abruptly curved at the base, so that the entire fruit is curved nearly in a semicircle. In *I. flavicans* the racemes are $1\frac{1}{2}$–$2\frac{1}{2}$ in. long, including the very distinct peduncles $\frac{1}{3}$–$\frac{3}{4}$ of an inch in length, and the pod somewhat abruptly tapers into a much more slender style not more than half as long as the seed-bearing part, which, together with the base of the style is straight, only the glabrous apical part of the style being incurved-hooked; the leaves are also larger in *I. flavicans*, otherwise the two species are very much alike and should be placed next each other. *I. diphylla* seems confined to the northern part and *I. flavicans* to the southern part of Tropical Africa. The following specimens of *I. flavicans* are contained in the Kew Herbarium :—

South Tropical Africa, *Baines*. Angola: by the River Longa, *Baum*, 668. Amboland: Olukonda, *Rautanen*, 216; Omupanda, *Wulfhorst*, 27. Ngamiland: Kwebe Hills, *Lugard*, 146, *Mrs. Lugard*, 190; Botletle Valley, *Lugard*, 197. Bechuanaland: Eastern Bamanguato Territory, *Holub*, 1098. Portuguese East Africa: Chiloane, *Scott*; Mozambique, *Peters*.

Stems spreading, creeping over the sand; flowers purple or deep pink.

Indigofera dentata, *N. E. Br.* *Annua*, erecta, ramosa, pilis medio affixis parce adpresse pubescens. *Folia* pinnata; foliola 5–7, opposita, 1·8–5 cm. longa, 6–14 mm. lata, lanceolata-oblonga, obtusa, integra vel dentata. *Racemi* foliis longiores, pedunculati. *Calyx* parvus; tubus oblique cupularis, inaequaliter 5-dentatus. *Corolla* purpurea, glabra. *Legumen* lineari-teres.

An erect branching *annual*, 12–14 in. high, thinly clothed on the stem, petioles, both sides of the leaves, calyx and pods, with adpressed, centrally attached hairs. *Leaves* 1–5 in. long, including the $\frac{1}{3}$–1 in. long petiole, the lowest trifoliolate, the rest imparipinnate, with 2–3 pairs of opposite leaflets and a terminal one, $\frac{3}{4}$–2 in. long, 3–7 lines broad, lanceolate-oblong, obtuse or truncate, entire or variably toothed, green, paler beneath; stipules about $\frac{1}{4}$ in. long, subulate. *Racemes* axillary, longer than the leaves, erect, many- (20- or more-) flowered; peduncle $1\frac{1}{2}$–$1\frac{3}{4}$ in. long; flowering part elongating and the flowers becoming rather distant, 2–5 in. long.

Bracts 1–1½ lin. long, subsetaceous, exceeding the buds and recurved. *Calyx* small; tube ½ lin. long, obliquely cup-shaped, 5-toothed; the 2 upper teeth about ¼ lin. long, deltoid; the 3 lower teeth ½ lin. long, subulate. *Corolla* glabrous, 3½ lin. long; vexillum ovate, acute, pale mauve, with darker veins and having two whitish spots at the base; alae slightly ovate-oblong, obtuse, mauve-purple; keel obtuse. *Pods* (immature) erect, linear-terete. *Seeds* several.

Kwebe Hills, 3,400 ft., *Mrs. Lugard*, 128; *Lugard*, 135.

A very distinct species, with something of the aspect of *I. trita*, L. f., but quite distinct in foliage, flowers and the erect pods. The toothed leaflets are very remarkable, although they do not appear to be quite constant, some specimens having all the leaflets entire, and in the examples I have seen the toothed leaflets are never so numerous as the entire ones, and yet are evidently quite normal.

*Indigofera variabilis, *N. E. Br.* in Journ. Bot., 1903, p. 192.† *Frutex* 90 cm. altus, ramis albidis. *Folia* brevissime petiolata, simplicia vel 3-foliolata; foliola 6–16 mm. longa, cuneato-obovata, obtusa, recurvato-apiculata, utrinque appresse subcanescentia. *Racemi* foliis multo breviores, 2–5-flori, subsessiles. *Calyx* vix 2 mm. longus, canescens; lobi subulati. *Corolla* 5 mm. longa. *Legumen* 7 mm. longum, teres.

A bushy *shrub*, 2–3 ft. high, the young branchlets densely clothed with adpressed white hairs, slightly rough to the touch. *Leaves* simple or trifoliolate with petioles scarcely ½ lin. long; leaflets 3–8 lin. long, 1½–2½ lin. long, narrowly cuneate-obovate, obtuse, with a recurved apiculus, longitudinally folded, adpressed-canescent on both sides, rather thinly in the older leaves. *Racemes* about half as long as the leaves, 2–5-flowered. *Calyx* scarcely 1 lin. long, with a shallow, bowl-shaped tube, and 5 subulate teeth, canescent. *Corolla* 2½ lin. long, bright red or pink, adpressedly pubescent on the vexillum and keel. *Legume* 3½ lin. long, terete, canescent. *Seeds* several.

Kwebe Hills, 3,400 ft., *Lugard*, 99; *Mrs. Lugard*, 119.

This species is, perhaps, more nearly allied to *I. pungens*, E. Mey., and *I. pulchra*, Vahl, than to any others; from the first it is distinguished by its variable leaves, short racemes, and indumentum; and from *I. pulchra* by its more shrubby habit, and different corolla, which is about three times as long as the calyx.

Tephrosia reptans, *Baker*.

Kwebe Hills, 3,300 ft., *Lugard*, 152; *Mrs. Lugard*, 175.

Annual, 1½–3 ft. high; flowers pinkish-mauve.

Tephrosia Apollinea, *DC.*

Kwebe Hills, 3,300 ft., *Mrs. Lugard*, 150.

Growing to 15 in. high; flowers carmine.

Tephrosia contorta, *N. E. Br.* *Frutex* ramosus; rami virgati, dense albo-tomentosi. *Folia* trifoliolata, foliolis cuneato-oblongis recurvato-apiculatis. *Flores* axillares, fasciculati, purpurei. *Legumen* spiraliter contortum, villoso-tomentosum.

A *shrub* with straight twig-like branches, clothed with a dense white tomentum. *Leaves* trifoliolate, ascending; petiole ½–1½ lin. long

† As only a very brief diagnosis was published at the place quoted, I here give a more complete description.

tomentose; leaflets 1–1½ in. long, 2½–5½ lin. broad, cuneate-oblong, obtuse, with a recurved hook-like apiculus, glabrous above, pubescent beneath with adpressed silky white hairs. *Flowers* axillary, fasciculate. *Calyx* 2–2½ lin. long, villous with fulvous hairs, 5-toothed to the middle: teeth subulate. *Corolla* 3½ lin. long, purple; standard pubescent on the back. *Legume* flat, twisted into one loose spiral, densely villous-tomentose with white hairs.

Kwebe, *Lugard*, 132.

A very distinct species, allied to *T. plicata*, Oliv., of Natal and the Transvaal, but the legume is twisted into a spiral instead of plicately folded, and the flowers are larger.

Mundulea suberosa, *Benth.*

Near Kwebe, *Lugard* 73; Kalahari Desert; Chukutsa Salt-pan and T'Klakane Pits, about 2,300 ft., *Lugard*, 302; between the Zuga River and Lichuana's Country, and also on the River Tamalakane, *McCabe*, 2; and without precise locality, *McCabe*, 43.

A bushy shrub, 4–6 ft. high, with purple flowers according to Lugard, and according to McCabe pinkish-yellow or pinkish and purple.

Sesbania punctata, *DC.* var.

Kwebe Hills, 3,300 ft., *Lugard*, 161, 161A; *Mrs. Lugard*, 168.

An erect annual, 4–5 ft. high, growing in swampy ground; flowers yellow speckled with black; leaves closed at night.

Aeschynomene indica, *L.*

Kwebe Hills, 3,300 ft., *Mrs. Lugard*, 219.

An erect annual, growing to 4 ft. high; flowers yellow.

Galactia Lugardi, *N. E. Br.* *Herba* longe procumbens, sparsim adpresse pubescens. *Folia* petiolata, pinnatim 3-foliolata; foliolum intermedium rhomboideo-lanceolatum, acutum; foliola lateralia oblique lanceolata, acuta. *Racemi* 15–17·5 cm. longi, pedunculati, laxi. *Flores* bini vel terni, purpurei. *Calyx* 7 mm. longus; lobi 2 superiores ad medium connati, laterales oblongi, omnes obtusi; lobus infimus paulo longior, acutus. *Corolla* 1 cm. longa, glabra; carina obtusa.

A *herb*, with long creeping stems, thinly pubescent in all parts except the corolla with minute adpressed hairs. *Leaves* large, pinnately trifoliolate; petiole ¼–½ in. long; lateral leaflets 2½–3¾ in. long, 1–1¼ in. broad, obliquely lanceolate, acute, shortly petiolulate, stipellate; middle leaflet 3½–5 in. long, 2–2¼ in. broad, rhomboid-lanceolate, acute, rounded at the base, shortly petiolulate, stipellate, separated from the lateral leaflets by a rachis 1–1½ in. long; stipules 2½–3 lin. long, falcate, acute, reflexed. *Racemes*, including the 2–2½ in. long peduncle, 4–7 in. long, lax. *Flowers* 2–3 together at the nodes of the raceme. *Bracts* 1½–2 lin. long, oblong, acute, caducous. *Pedicels* 1½ lin. long. *Calyx* about 3 lin. long, lobed to the middle; the 2 upper lobes connate for half their length, and together with the lateral lobes oblong, obtuse; the lowest lobe slightly longer than the rest, acute. *Corolla* 5 lin. long, glabrous, purple; keel obtuse. *Legume* not seen.

Kwebe, *Lugard*, 61.

A well-marked species, the rhomboid-lanceolate middle leaflet easily distinguishes it from all the others. In the bifid upper lip of

the calyx it differs somewhat in generic character, but there is no genus with which it can be so well associated, and in the absence of fruit I abstain from proposing a genus upon so slender a point of difference.

Vigna triloba, *Walp.*
Kwebe Hills, 3,400 ft., *Lugard*, 185 ; *Mrs. Lugard*, 170.
A trailing annual ; leaves sometimes variegated ; flowers mauve or purple.

Vigna Burchellii, *Harv.*
Kwebe, *Lugard*, 63 ; Botletle Valley, *Lugard*, 240 ; Kalahari Desert and between Lake Ngami and the River Zuga, *McCabe*, 12.
Grows freely, with long trailers, but does not climb ; flowers purple and pink.

Dolichos gibbosus, *Thunb.*
Bechuanaland ; near Palapye, 3,000 ft., *Lugard*, 239.

Rhynchosia caribaea, *DC.*
Kwebe Hills, *Lugard*, 173 ; *Mrs. Lugard*, 207.
Creeping on the ground ; flowers orange-yellow, with chocolate stripes.

Lonchocarpus sp. ?
Near Lake Ngami, *Lugard*, 21.
Tree 20 ft. high, flowering before the leaves appear.
The specimen is leafless and without fruit, so that it cannot be properly determined.

Peltophorum africanum, *Sond.*
Northern Kalahari Desert, 3,000 ft., *Lugard*, 241.
A bushy tree 20 ft. high ; flowers yellow.

Hoffmanseggia rubra, *Engl.*
Kalahari Desert ; at the T'Klakane Pits, 2,500 ft., *Lugard*, 305.
A thorny bush, growing to 5 ft. high ; flowers pink.
The specimens are much more spiny, and have shorter racemes than in the typical form, but are otherwise identical.

Cassia obovata, *Collad.*
Kalahari Desert ; near T'Klakane Pits, *Lugard*, 229 ; Kwebe Hills, 3,000 ft., *Mrs. Lugard*, 201.
Creeping on the ground ; flowers yellow.

Cassia Absus, *Linn.*
Kwebe Hills, 3,300 ft., *Lugard*, 137 ; *Mrs. Lugard*, 193.
Annual, growing to 15 in. high ; flowers orange or buff.

Bauhinia esculenta, *Burch.*
Kalahari Desert ; Kwebe to Palapye, 3,000 ft., *Lugard*, 242.
A ground-creeper ; flowers yellow.

Bauhinia macrantha, *Oliv.*
Kwebe Hills, 3,300 ft., *Lugard*, 144 ; *Mrs. Lugard*, 189.
A bush 4–15 ft. high, flowers white, pod green.

Copaifera Mopane, *Kirk.*
Ngamiland and Northern Kalahari Desert, 3,000 ft., *Lugard*, 243 ; near T'Klakane Pits, 3,000 ft., *Lugard*, 296.

A tree growing to 25 ft. high; flowers white; fruit green. It is called "Mopani" by the natives.

Copaifera coleosperma, *Benth.*

Okavango Valley, about 3,000 ft., *Lugard*, 244.

A fine spreading tree, growing to 40 ft. high; pod green, containing one scarlet seed. Found away from the river in dry sandy country. The natives boil the seeds, from which they get a soup.

Dichrostachys arborea, *N. E. Br.* *Arbor* 6 m. alta, spinosa. *Folia* 1·8–5·6 cm. longa; pinnae 10–15-jugae, 6–14 mm. longae; foliolae 12–28-jugae, minutae, 0·7–1·5 mm. longae. *Pedunculi* 1·5–2·5 mm. longi. *Filamenta* florum inferiorum ad 10 mm. longa.

A *tree* growing to 20 ft. high. *Branchlets* and spines horizontally spreading, at first puberulous, becoming glabrous, grey. *Leaves* bipinnate, $\frac{3}{4}$–$2\frac{1}{4}$ in. long, apparently less than $1\frac{1}{4}$ in. broad when fully expanded, pubescent except on the upper surface of the leaflets; pinnae in 10–15 pairs, 3–7 lin. long, with a stalked gland between the basal pair; leaflets in 12–28 pairs, minute, $\frac{1}{3}$–$\frac{3}{4}$ lin. long, oblong-linear, obtuse. *Spikes* $1\frac{1}{2}$–2 in. long, cylindric, obtuse, with pubescent peduncles $\frac{3}{4}$–$1\frac{1}{4}$ in. long. *Lower* or *sterile flowers* purple; calyx $\frac{1}{3}$ lin. long, cupular, minutely 5-toothed, pubescent; corolla glabrous, with a tube $\frac{1}{2}$ lin. long and five ovate acute lobes $\frac{1}{3}$ lin. long, $\frac{1}{4}$ lin. broad; staminal filaments 4–5 lin. long. *Upper* or *fertile flowers* yellow; calyx $\frac{2}{5}$ lin. long, campanulate, 5-toothed, pubescent; corolla glabrous, with a tube $\frac{2}{3}$–$\frac{3}{4}$ lin. long and five oblong acute lobes $\frac{1}{3}$–$\frac{1}{2}$ lin. long, $\frac{1}{5}$ lin. broad; ovary densely pubescent. *Legume* not seen.

Totin, near Lake Ngami, *Lugard*, 27.

Dichrostachys Lugardae, *N. E. Br.* *Frutex* ad 3 m. altus, spinosus. *Folia* 5–8·7 cm. longa; pinnae 6–11-jugae, 1·6–3 cm. longae; foliola 20–36-juga, 2·5–3·5 mm. longa. *Pedunculi* 3·7–5·6 cm. longi. *Filamenta* florum inferiorum ad 1·4 cm. longa.

A thorny *bush* 8–10 ft. high, with a glabrous greyish-brown bark. *Leaves* bipinnate, pubescent except on the upper surface of the leaflets, 2–$3\frac{1}{2}$ in. long, $1\frac{3}{4}$–$2\frac{1}{4}$ in. broad when fully expanded; pinnae in 6–11 pairs, 8–15 lin. long, spreading, with a long-stalked gland between the basal pair; leaflets in 20–36 pairs, $1\frac{1}{4}$–$1\frac{3}{4}$ lin. long, linear, subfalcate, acute. *Spikes* 1–2 in. long, cylindric, obtuse, with pubescent peduncles $1\frac{1}{2}$–$2\frac{1}{4}$ in. long. *Lower* or *sterile flowers* purple; calyx $\frac{1}{4}$ lin. long, cupular, minutely 5-toothed, pubescent; corolla glabrous, with a tube $\frac{1}{3}$–$\frac{1}{2}$ lin. long and five oblong-ovate acute lobes $\frac{1}{2}$–$\frac{2}{3}$ lin. long, $\frac{1}{3}$–$\frac{2}{3}$ lin. broad; staminal filaments 6–7 lin. long. *Upper* or *fertile flowers* yellow; calyx $\frac{1}{3}$ lin. long, campanulate, 5-toothed, pubescent; corolla glabrous, with a tube $\frac{2}{3}$–$\frac{3}{4}$ lin. long and five ovate-oblong acute lobes $\frac{1}{2}$ lin. long, $\frac{1}{4}$ lin. broad; ovary densely pubescent. *Legume* (according to a drawing by Mrs. Lugard) flat, curled, about $3\frac{1}{2}$ in. long and $\frac{1}{4}$ in. broad, brown.

Kwebe Hills and Kalahari, 3,000–3,500 ft., *Lugard*, 42; *Mrs. Lugard*, 78.

Acacia arabica, *Willd.*

Totin, near Lake Ngami, *Lugard*, 28; Kwebe Hills, 3,300 ft. *Mrs. Lugard*, 30.

A tree growing to 15 ft. in height; flowers golden yellow.

Acacia hebeclada, *DC.?*

Lake River, *Lugard*, 20.

Grows to 12 ft. high as a bush. The specimen is without fruit, and the identification is, therefore, uncertain.

Acacia litakunensis, *Burch.*

Kwebe Hills, 3,200–3,600 ft., *Mrs. Lugard*, 49.

A bush or tree growing to 15 ft. in height; flowers creamy, very sweetly scented.

Acacia ferox, *Benth.*

Kalahari Desert, 3,000 ft., *Mrs. Lugard*, 13.

A bush growing to 20 ft. in height, flowering before the leaves appear; flowers white, strongly scented; pod chocolate. Known locally as "Hack-thorn."

Acacia rufobrunnea, *N. E. Br. Rami*, spini, petioli et rhachides rufo-brunnei. *Stipulae* spinescentes, rectae. *Folia* bipinnata; pinnae 18–24-jugatae: foliola 20–24-juga, 2·5 mm. longa, linearia, obtusa, glabra; rhachides pubescentes. *Flores* capitati, albi. *Pedunculi* fasciculati, supra medium involucrati, pubescentes.

Young *branches* reddish-brown, thinly pubescent. *Stipulary spines* equal, straight, 1–1¼ in. long, reddish-brown, pubescent when young. *Leaves* 4–5 in. long, abruptly bipinnate; pinnae in 18–24 pairs, 7–11 lin. long; leaflets in 20–24 pairs, 1¼ lin. long, rather less than ½ lin. broad, linear, obtuse, glabrous, with a central depressed midrib on the under side; petiole with a sessile gland near its base, and together with the rachides reddish-brown and pubescent along the upper side. *Flowers* capitate, white. *Peduncles* axillary, fascicled, 6–8 lin. long, with an involucel 1–2 lin. below the apex, pubescent below the involucel, somewhat tomentose above it. *Calyx* less than half the length of the corolla, ½ lin. long, infundibuliform, shortly crenate-dentate, puberulous in the upper part. *Corolla* 1⅓ lin. long, tubular, 5–6-toothed to one quarter of the way down, glabrous; teeth ovate, subobtuse. *Stamens* lin. long. *Legume* not seen.

Botletle Valley, *Lugard*, 245.

Allied to *A. verugera*, Schweinf., but easily distinguished by its reddish brown bark, spines, and leaf-rachides.

Acacia caffra, *Willd.*

Kwebe, *Lugard*, 93; Tamalakane River, near Lake Ngami, *McCabe*, 29.

A bush, seldom above 8 ft. high; bark of the branches white; flowers white (*Lugard*). Grows about 20 ft. high, with short thick thorns on the stem; flowers whitish or pale yellow, looking quite white at a distance (*McCabe*).

Acacia Lugardae, *N. E. Br. Arbor* ad 4·75 m. alta. *Rami* spinis parvis recurvis armati, puberuli, brunnei, demum glabri et cinerei; spinae stipulares nullae. *Folia* bipinnata; pinnae 12–14-jugae; foliola 20–32-juga, 3–3·5 mm. longa, lineari-oblonga, subobtusa, basi subtruncata, minute ciliolata; petioli spinis parvis recurvis armati, dense puberuli. *Spicae* fasciculatae, in paniculam terminalem dispositae. *Pedunculi* minute tomentosi. *Flores* glabri, luteo-albi. *Legumen* rectum, planum, lineari-oblongum, utrinque acutum, stipitatum, seminibus 3–4.

A *tree*, up to 15 ft. high. *Branches* greyish, at first minutely subtomentose, becoming glabrous, armed with scattered hooked prickles $\frac{3}{4}$–$1\frac{1}{2}$ lin. long, no stipular prickles. *Leaves* bipinnate, 2–$3\frac{1}{2}$ in. long, puberulous on the primary and secondary rachides and armed with small hooked prickles along the underside of the primary rachis; pinnae in 12–14 pairs, $\frac{3}{4}$–$1\frac{1}{4}$ in. long, with a sessile gland between the lowest and between the 1–2 uppermost pairs; leaflets in 20–32 pairs, $1\frac{1}{2}$–$1\frac{3}{4}$ lin. long, $\frac{1}{3}$ lin. broad, straight, linear-oblong, subobtuse, unequal-sided, nearly truncate at the base, minutely ciliolate, otherwise glabrous. *Racemes* several or numerous in a terminal leafless inflorescence or sometimes axillary from the leaves, 1–3 at each node, $1\frac{3}{4}$–$2\frac{1}{4}$ in. long (including the $\frac{1}{4}$–$\frac{1}{2}$ in. long minutely tomentose peduncle), densely many-flowered. *Flowers* creamy-white. *Calyx* not half as long as the corolla, $\frac{1}{2}$ lin. long, campanulate, with short broadly deltoid teeth, glabrous. *Corolla* tubular-campanulate, glabrous; tube $\frac{3}{4}$–$\frac{7}{8}$ lin. long, lobes $\frac{2}{3}$–$\frac{1}{2}$ lin. long, ovate or oblong-ovate, acute. *Stamens* very numerous, about twice as long as the corolla. *Disk* cup-shaped. *Ovary* ellipsoid, densely villose-tomentose, 4-ovuled, seated on a glabrous stipe $\frac{2}{3}$ lin. long; style $1\frac{2}{3}$ lin. long, glabrous. *Pod* $1\frac{1}{2}$–$1\frac{3}{4}$ in. long, $\frac{1}{3}$–$\frac{1}{2}$ in. broad, linear-oblong, flat, thin, acute at each end, 3–4-seeded, reddish-brown, glabrous or nearly so, with only here and there a trace of the hairs which densely clothe the ovary, tapering at the base into a stalk 4–5 lin. long.

Kwebe Hills, 3,300 ft., *Mrs. Lugard*, 195.

This species is very similar to *A. caffra*, Willd., but is easily distinguished by the prickles on the leaves, the very much smaller calyx (which is open from a very early stage, not closed over the corolla as in *A. caffra*), and by the very hairy ovary and the shorter, fewer-seeded pods.

Acacia glandulifera, *Schinz.*

Kwebe Hills, 3,000 ft., *Mrs. Lugard*, 14, 16.

A bush, up to 6 feet high. This very distinct species is easily recognised by the absence of an involucel on the peduncles and the sessile glands scattered on the petioles of the leaves and densely covering the flat falcate pods.

Acacia kwebensis, *N. E. Br.* *Arbor* 6 m. alta. *Stipulae* spinescentes, parvae, uncinatae, brunneae. *Folia* hysterantha, bipinnata; pinnae 3–5-jugae; foliola 8–13 juga, oblique lineari-oblonga, subacuta, glabra, pallida; petiolus et rhachis pubescentes. *Flores* spicati, albi. *Pedunculi* et *calyces* tomentosi. *Legumen* rectum, lineari-oblongum, acutum.

A *tree*, attaining a height of 20 ft., flowering before the leaves appear, with a pearly-white bark. *Branchlets* with a short spreading pubescence when young; bark pale grey. *Stipulary spines* equal, 2–3 lin. long, recurved, brown. *Leaves* abruptly bipinnate; pinnae in 3–5 pairs; leaflets in 8–13 pairs, $2\frac{1}{4}$–3 lin. long, $\frac{3}{4}$ lin. broad, obliquely linear-oblong, subacute, glabrous, pale glaucous-green; petiole and rachis with a fine spreading pubescence. *Flowers* spicate, white. *Spikes* somewhat clustered at the nodes, the short primary peduncle umbellately dividing into 2–3 secondary peduncles about $\frac{1}{2}$ in. long, tomentose; the flowering part 1–2 in. long, 6–7 lin.

diam., dense. *Calyx* about half as long as the corolla, 1¼ lin. long, campanulate, acutely 5-toothed to about one-third the way down, tomentose. *Corolla* 2 lin. long, tubular, with five spreading teeth, minutely and thinly adpressed-pubescent outside; teeth ½ lin. long, ovate, acute. *Stamens* 3½ lin. long. *Legume* shortly stipitate, 3–3½ in. long, 6–7 lin. broad, flat, acute at both ends, tapering at the base into a stipe ¼ in. long.

Kwebe Hills, 3,000–3,400 ft., flowering in September, *Mrs. Lugard*, 24.

This species is very similar to *A. erubescens*, Welw., and should stand next to that species, from which it differs in having white flowers, with the corolla and stamens about twice as long as in that species. I have not seen the pod, but describe it from Mrs. Lugard's excellent drawing.

Albizzia Harveyi, *Fourn.* in Bull. Soc. Bot. Fr. xii., 399 (1865).

Legume 3¾–4¼ in. long, 1 in. broad, flat, thin, of parchment-like consistence, acute at both ends, very shortly stipitate, broadly sinuate-crenate along both margins, with the notches opposite the insertion of the funicles, bullate over the seeds, glabrous, green, suffused with purple. *Funicle* with a double curve just below its attachment to the hilum. *A. pallida*, Harv. in Fl. Cap. ii., 284, not of Fourn. *A. hypoleuca*, Oliver, Fl. Trop. Afr. ii., 356.

Kwebe Hills, 3,300 ft., *Mrs. Lugard*, 32.

The fruit of this plant has not been described previously. According to McCabe it is a tree of about 10 ft. in height, but according to Mrs. Lugard it grows to 20 ft. and is "the only thornless Acacia found in the country." The flowers are creamy-white.

Albizzia Lugardi, *N. E. Br.* *Arbor* ad 12 m. alta. *Folia* bipinnata; pinnae 2–3-jugae, 2–4-foliolatae; foliola magna, oblique obovata, obtusa. *Flores* ignoti. *Legumen* lineari-ligulatum, utrinque acutum, coriaceum, planum.

A *tree*, growing to 40 ft. high, with very hard wood. *Branches* greyish-brown, armed with recurved prickles swollen at the base, the swelling increasing in size with age. *Leaves* bipinnate, thinly puberulous in all parts; pinnae in 2–3 pairs, the terminal pair usually largest, each with one or two pairs of obliquely obovate leaflets, very obtusely rounded or slightly notched at the apex, ½–1 in. long, ⅓–⅔ in. broad. *Pods* 5½ in. long, ⅔–¾ in. broad, linear-ligulate, acute at both ends, rigidly coriaceous, thin and flat, straight, with even margins, glabrous, brown, 5–6-seeded. *Seeds* flat, orbicular.

Okavango Valley, about 3,000 ft., locally known as the "Knobby thorn," *Lugard*, 246.

I refer this to *Albizzia* with some hesitation, as the specimen is flowerless, but in its general characteristics it agrees with that genus, and in foliage somewhat resembles *A. anthelmintica*, A. Brongn.

Albizzia anthelmintica, *A. Brongn.*

Near Kwebe Hills, 3,200 ft., *Mrs. Lugard*, 15.

A large bush, 20 ft. high, growing at the foot of hills, not found upon them; flowers creamy-white; pods bright green.

Saxifragaceae.

Vahlia capensis, *Thunb.*

Kwebe Hills, 3,300 ft., around swampy places, *Mrs. Lugard*, 145.

Plant growing to 6 in. high, with golden flowers.

Crassulaceae.

Crassula elata, *N. E. Br.* *Herba* elata, pubescens. *Folia* opposita, superioria oblonga, subacuta, ciliata. *Verticillastri* densi, multiflori, in spicam interruptam elongatam dispositi. *Sepala* oblongo-lanceolata, acuta. *Petala* lineari-oblonga, dorso ad apicem apiculata, glabra, rubescentia.

An erect *herb* about 2 ft. high, everywhere, with the exception of the corolla and inner parts of the flowers, clothed with a short white pubescence. Lower part of the stem not seen, upper part ending in a narrow, interrupted, spike-like inflorescence a foot long. *Upper stem-leaves* about 1½ in. long, 5–6 lin. broad, oblong or lanceolate-oblong, sub-acute, gradually passing into small ovate bracts, ciliate. *Flowers* in small dense sessile cymules or verticillasters about ¾-in. diam. along the terminal part of the stem, very numerous and about ½-in. apart. *Bracteoles* 1½–2½ lin. long, linear-lanceolate or subulate. *Pedicels* 1½ lin. long. *Sepals* 1½ lin. long, oblong-lanceolate, acute, ciliate. *Petals* slightly exceeding the sepals, 1⅔ lin. long, narrowly oblong, obtuse, with a dorsal apiculus at the apex, glabrous. *Stamens* not exserted, glabrous. *Hypogynous scales* quadrate, bifid. *Carpels* oblong, obtuse, glabrous; stigma quite sessile, slightly oblique.

Bechuanaland; near Palapye, 3,000 ft., *Lugard*, 247.

This species is allied to *C. tomentosa*, Thunb., differing in its more numerous, more crowded whorls of flowers and short petals, which, according to Lugard, are brown, but in the dried specimen appear to have been dull reddish.

Kalanchoe multiflora, *Schinz.*

Kwebe Hills, *Mrs. Lugard*, 224.

Corolla green, edged with yellowish-red on the lobes.

Kalanchoe glandulosa, *Hochst.* var.?

Kwebe Hills, *Mrs. Lugard*, 227.

Flowers brick-red.

Combretaceae.

Terminalia sericea, *Burch.*

Kalahari Desert; at T'Klakane Pits, 2,500 ft? *Lugard*, 306.

The common scrub-bush of the desert, everywhere where no water is. Usually a bush up to 6 ft., but sometimes grows to a tree 20 ft. high; flowers greenish-white.

Terminalia prunioides, *Laws.*

Kwebe Hills, 3,000–3,500 ft., *Lugard*, 41; *Mrs. Lugard*, 101.

A tree, 20–30 ft. high, 2½ ft. in girth, with very hard and tough wood, useful as timber; flowers white; fruit dark red.

Combretum truncatum, *Welw.*

Totin, near Lake Ngami, *Lugard*, 29; Kwebe Hills, 3,300 ft., *Mrs. Lugard*, 72.

A tree, 25–30 ft. high, 15–18 inches in diameter ; flowers green, sweetly scented.

Combretum Eilcherianum, *Schinz* ? (*C. Eilkeri*, Engler & Diels. Monog. Afr. Pflanz.-Fam. Combret. 61.)

Botletle River, *Lugard*, 9.

A tree, growing to 20 ft. high ; flowers whitish-green ; fruit flat, brown.

Combretum kwebense, *N. E. Br.* *Frutex* ramulis cinereo-tomentosis. *Folia* opposita, breviter petiolata, elliptica vel subobovata, acuta, subcuspidata vel obtusa, basi emarginata vel leviter cordata, primum utrinque pubescentia, demum glabrescentia, infra minute glandulosa. *Spicae* axillares, pedunculatae, breviter oblongae. *Calycis tubus* pubescens et glandulosus, 4-dentatus. *Petala* minuta, late cuneato-obovata et truncata vel rotundata, ciliata. *Stamina* exserta.

A *bush* 10 ft. high, tomentose on the young shoots, becoming glabrous, with a brown bark. *Leaves* opposite, contemporary with the flowers ; petiole 1–2 lin. long ; blade $1\frac{1}{4}$–2 in. long, 10–15 lin. broad, elliptic or slightly obovate, acute, shortly cuspidate, or occasionally obtuse, emarginate or slightly cordate at the obtusely rounded base, at first thinly tomentose-pubescent on both sides, and minutely glandular beneath, becoming nearly glabrous above, with very minute whitish papillae in the dried state. *Spikes* axillary, simple. *Peduncle* 4–9 lin. long. *Flowers* sessile, yellowish-green, sweet-scented, crowded into an oblong spike $\frac{1}{2}$–$\frac{3}{4}$ in. long and about $\frac{1}{2}$-in. diam. *Bracts* minute, subulate. *Calyx-tube* pubescent and glandular, the part above the ovary broadly cup-shaped, thinly pubescent within, 4-toothed ; teeth deltoid, acute ; disk about $\frac{1}{3}$ as long as the cup, with a free hairy margin. *Petals* minute, $\frac{1}{3}$-$\frac{1}{2}$ lin. long and broad, broadly cuneate-obovate and truncate, or somewhat circular, ciliate. *Stamens* exserted, 2 lin. long : anthers very obtuse. *Fruit* not seen.

Kwebe, *Lugard*, 48.

Allied to *C. fulvotomentosum*, Engl. & Diels.

Combretum cataractarum, *Diels.*

Lake River, *Lugard*, 15 ; Kwebe Hills, 3,200 ft., *Lugard*, 15A ; *Mrs. Lugard*, 10.

A tree-creeper, up to 20 ft. high ; flowers white, appearing in August and September, about a month before the leaves ; fruit russet-green or pink.

Combretum apiculatum, *Sond.*

Kwebe Hills, 3,300 ft., *Mrs. Lugard*, 25.

A tree, 15 feet high. A very early flowerer, the same tree profusely in flower and full leaf together in December ; flowers green.

Lythraceae.

Nesaea rigidula, *Koehne.*

Botletle Valley, *Lugard*, 248.

Onagrarieae.

Jussiaea repens, *Linn.*

In water at the junction of the Tamalakane and Botletle Rivers. *Lugard*, 3.

Flowers primrose-yellow.

Turneraceae.

Wormskioldia serrata, *Hochst.*
Kwebe Hills, 3,300 ft., *Lugard*, 116 ; *Mrs. Lugard*, 105.
An annual, growing to 9 in. high ; flowers orange.

Wormskioldia longepedunculata, *Mast.*
Northern Kalahari Desert ; near Inkonane Pits, about 3,000 ft., *Lugard*, 292.
The plant grows to 6 in. high ; flowers scarlet.

Cucurbitaceae.

Trochomeria debilis, *Hook. f.*, var.
Kwebe Hills, 3,300 ft., *Lugard*, 43, 168 ; *Mrs. Lugard*, 39.
Flowers green.

Lagenaria vulgaris, *Ser.*
In cultivation by Lake River, *Lugard*, 191.
Flowers pure white.

Cucumis Figarei, *Del.* var. **echinophorus**, *Naud.*
Kwebe Hills, 3,300 ft., *Lugard*, 169 ; *Mrs. Lugard*, 156.
A common Kalahari ground-melon ; flowers yellow ; fruit yellowish-green.

Citrullus vulgaris, *Schrad.*
Kwebe Hills, 3,300 ft., *Mrs. Lugard*, 154.
This is the common Kalahari melon. It is eaten by Bushmen, affording often the sole water supply to them and also to antelopes ; flowers yellow ; fruit mottled with yellow and green.

Citrullus Naudinianus, *Hook. f.*
Kwebe Hills, 3,300 ft., *Mrs. Lugard*, 155.
One of the Kalahari melons ; flowers yellow ; fruit straw-coloured.

Coccinea sp. ? Specimen with female flowers only.
Kwebe, *Lugard*, 64.

Coccinea sp. ? Specimen in fruit only.
Kwebe, *Lugard*, 120.

Coccinea sp. ? Specimen with female flowers and fruit, no male flowers.
Kwebe Hills, 3,300 ft., *Mrs. Lugard*, 149.
A climber ; flowers pale ochre, with darker vein ; fruit at first green variegated with whitish, becoming magenta when ripe.

Toxanthera Lugardae, *N. E. Br.* *Herba* scandens, monoica, subscabrido-pubescens. *Folia* peliolata, late 3–5-loba, basi latissime cordata ; lobi oblongi vel rotundati, acute denticulati, acuti vel obtusi. *Cirrhi* simplices. *Flores* masculi corymboso-racemosi ; calycis tubus campanulatus ; lobi attenuato lanceolati, integri vel utrinque 1–2-dentati, 4 mm. longi ; petala libera, oblonga, obtusa, 2 lin. longa ; staminum filamenta libera ; antheræ valde curvatæ. *Flores feminei* solitarii ; calyx et corolla maris ; ovarium anguste fusiforme, pubescens ; stigma reflexum, copriniforme, integrum. *Fructus* 7·5–8·7 cm. longus, fusiformis vel cylindricus, rostratus.
A climbing *herb*, monoecious. *Stem* rather slender, minutely pubescent. *Leaves* petiolate ; petiole ¾–1 in. long ; blade 1¾–3 in.

long and broad, 3–5-lobed, cordate at the base, with a broad open sinus twice as broad as deep; scaberulous-pubescent on both sides; lobes oblong or rounded, acute or obtuse, acutely denticulate. *Tendrils* simple, puberulous. *Male flowers* in pedunculate corymbs which elongate into racemes that are shorter than the leaves; peduncle ¾–1 in. long, puberulous; pedicels 3–4 lin. long, slender, puberulous; calyx 5-lobed, pubescent outside; tube 1 lin. long, campanulate, with a ring of woolly hairs at the mouth inside; lobes 2 lin. long, ½ lin. broad at the base, lanceolate-attenuate or subulate, 1–2-toothed on each side or entire; petals free, 1¾ lin. long, 1 lin. broad, oblong, obtuse, pubescent on the back, glandular on the inner face, yellow; stamens inserted at the mouth of the tube; filaments free or more or less connate, ⅓ lin. long; anthers ¾ lin. long, free or more or less connate, very much curved. *Female flowers* solitary; pedicels 1½–2 lin. long, pubescent; ovary ½–¾ lin. long, narrowly fusiform, pubescent; calyx and corolla as in the male flowers; style about 2 lin. long, its upper part concealed by the reflexed, entire, thimble-shaped stigma. *Fruit* according to Mrs. Lugard's drawing, 3–3½ in. long and ¾ in. thick when ripe, fusiform or cylindric, tapering into a beak, smooth, at first green, afterwards becoming bright red, dotted with white; flesh orange-yellow; seeds ellipsoid, deep carmine.

Kwebe Hills, 3,300 ft., *Mrs. Lugard*, 54.

This is readily distinguished from *T. natalensis*, Hook. f., by its more deeply lobed leaves with more acute lobes, the shorter male inflorescence, and the short pedicels of the female flowers.

Toxanthera kwebensis, *N. E. Br.* *Herba* scandens, monoica, scabrido-pubescens, *T. Lugardae* similis, sed foliis integris orbiculato-cordatis apice abrupte et breviter acutis, cirrhis bifidis et floribus majoribus differt.

Plant very similar to the preceding species in habit and pubescence, but stouter. *Leaves* petiolate; petiole stout, 1¼–2 in. long; blade 3–3½ in. long and broad or larger ?, entire, orbicular in outline, deeply cordate at the base, with an elliptic or elliptic-oblong sinus twice as deep as broad, acutely denticulate on the margin, abruptly and shortly acute at the apex. *Tendrils* bifid, puberulous. *Male flowers* in pedunculate corymbs which elongate into racemes shorter than the leaves; peduncle about 1 in. long, puberulous; pedicels 1¼–2 lin. long, puberulous; calyx 5-lobed, pubescent outside; tube 1¼ lin. long, broadly campanulate, with a ring of woolly hairs at the mouth inside; lobes 2½–2¾ lin. long, ⅓–½ lin. broad at the base, gradually tapering to a slender point, entire; petals free, 2½ lin. long, 1⅓ lin. broad, ovate, obtuse, pubescent on the back, glandular on the inner face, yellowish-green; stamens inserted at the mouth of the tube; filaments ¾ lin. long, 4 of them more or less connate in pairs; anthers 1–1¼ lin. long, curved, free or sometimes connate. *Female flowers* solitary; pedicels 2–3 lin. long, pubescent; ovary ½ in. long, narrowly fusiform, pubescent; calyx and corolla as in the male flowers; stamens rudimentary, without anthers; style about 1⅔–2 lin. long, the upper part concealed by the reflexed, entire, thimble-shaped stigma. *Fruit* not seen.

Kwebe, *Lugard*, 150.

This differs from *T. Lugardae*, N.E.Br., in its stouter stem and petioles, entire (not at all lobed) leaves with a much narrower basal sinus, bifid tendrils, and larger flowers. According to Lugard the plant is said to be poisonous.

Melothria Marlothii, *Cogn.*
Kwebe Hills, 3,300 ft., *Mrs. Lugard*, 129.
Climbing; flowers white.

Blastania fimbristipula, *Kotsch. & Peyr.*
Kwebe Hills, 3,300 ft., *Mrs. Lugard*, 174.
A creeper; flowers yellowish-cream.

Corallocarpus Welwitschii, *Hook. f.*
Kwebe Hills, 3,300 ft., *Mrs. Lugard*, 37, 132.
Climbing; flowers greenish-yellow; fruit scarlet.

Ficoideae.

Trianthema pentandra, *L.*
Kwebe Hills, 3,300 ft., *Mrs. Lugard*, 97.
Plant spreading; flowers green; fruit maroon-coloured.

Mollugo Bainesii, *Oliv.*
Kwebe Hills, in swampy places, 3,300 ft., *Mrs. Lugard*, 152.
Plant spreading on the ground; flowers greenish-white.

Mollugo hirta, *Thunb.*
Kwebe Hills, in swamps, 3,000 ft., *Mrs. Lugard*, 73.
Plant erect, growing to 6 in. high; flowers green and white.

Mollugo nudicaulis, *Linn.*
Kwebe Hills, in swampy places, 3,300 ft., *Lugard*, 156; *Mrs. Lugard*, 153.
Annual, growing to 8 in. high; flowers greenish-white.

Mollugo Cerviaria, *Ser.*
Kwebe Hills, 3,400 ft., *Mrs. Lugard*, 86.
An erect annual, growing to 3 in. high; flowers white and green.

Giesekia pharnaceoides, *Linn.*
Kwebe, *Lugard*, 102.

Giesekia pentadecandra, *DC.* var ?
Kwebe Hills, 3,300 ft., *Lugard*, 101; *Mrs. Lugard*, 141.
An annual growing to 8 in. high, but widely spreading; flowers deep pink; leaves often blotched with pink. This plant seems to be dioecious.

Semonvillea fenestrata, *Fenzl.*
Kwebe Hills, 3,200 ft., *Lugard*, 103; *Mrs. Lugard*, 136.
An erect annual, growing to 15 in. high; flowers white.

Semonvillea sp. ?
Kwebe, *Lugard*, 107.
The specimens are too young for their proper identification.

Limeum viscosum, *Fenzl.* var. **longepedunculatum**, *Schinz.*
Kwebe Hills, 3,300 ft., *Lugard*, 100; *Mrs. Lugard*, 93.
An erect annual, growing to 9 in. high; flowers white.

Limeum kwebense, *N. E. Br.* *Annua*, glabra. *Folia* petiolata, oblonga vel lineari-oblonga, obtusa. *Cymae* pedunculatae, terminales

vel pseudo-axillares, densae. *Sepala* 5, oblonga, mucronato-acuta. *Petala* 5, spathulato-elliptica, obtusa. *Stamina* 7. *Fructus* didymus, rugosus, atratus.

A dwarf *annual* with widely spreading branches, glabrous in all parts. *Leaves* alternate, oblong, oblong-lanceolate or linear-oblong, obtuse, rounded or cuneate at the base; petiole $1\frac{1}{2}$–2 lin. long; blade $\frac{1}{2}$–$1\frac{1}{2}$ in. long, $1\frac{1}{2}$–$4\frac{1}{2}$ lin. broad. *Cymes* terminal or falsely axillary, pedunculate, densely many-flowered, $\frac{1}{2}$–1 in. in diam. *Peduncles* $\frac{1}{4}$–$1\frac{1}{4}$ in. long. *Bracts* $\frac{3}{4}$–1 lin. long, ovate, acuminate, membranous, with a green keel. *Pedicels* $\frac{1}{2}$ lin. long. *Sepals* 5, about $1\frac{1}{4}$ lin. long, $\frac{2}{3}$ lin. broad, oblong, mucronate-acute, concave, membranous, with a narrowly winged green keel. *Petals* 5, about $\frac{3}{4}$ lin. long, scarcely $\frac{1}{2}$ lin. broad, spathulate-elliptic, obtuse, membranous, white. *Stamens* 7, about $\frac{3}{4}$ lin. long; filaments dilated at the base, papillate-pilose; anthers yellow. *Ovary* 2-celled; styles 2, short. *Fruit* didymous, rugose, blackish.

Kwebe, chiefly in marshy places, *Lugard*, 186.

Allied to *L. africana*, Burm., but differing in being an annual and in having flowers only about half as large.

Rubiaceae.

Oldenlandia cynanchica, *K. Schum*?

Kwebe Hills, 3,300 ft., *Lugard*, 166; *Mrs. Lugard*, 111.

Plant growing to 15 in. high; flowers white.

Gardenia spatulifolia, *Stapf & Hutch.*

Botletle River, seldom any distance from the river bank, *Lugard*, 7.

A tree, 20 ft. high; flowers cream-coloured, turning to yellow with age.

Vangueria lasioclados, *K. Schum.*

Kwebe Hills, 3,300 ft., *Mrs. Lugard*, 59.

A bush, growing to a height of 6 ft.; flowers green.

Spermacoce deserti, *N. E. Br.* *Caules* acute 4-angulares, angulis scaberulis. *Folia* opposita, sessilia, ligulata vel anguste oblonga, acuta, rigida, utrinque glabra, marginibus scabris; stipulae 5–6-setiferae, glabrae. *Flores* axillares, dense conferti. *Calycis lobi* lanceolati, acuti, scabrido-ciliati. *Corolla* 4-loba, alba; lobi ovato-oblongi, obtusi, dorso parce pubescentes.

Stems subsimple, herbaceous, acutely 4-angled, minutely ciliate-scabrid on the angles, otherwise glabrous; internodes 1–$1\frac{1}{2}$ in. long. *Leaves* opposite, sessile, $\frac{3}{4}$–2 in. long, 2–4 lin. broad, linear-oblong, acute, rather rigid, glabrous on both sides, minutely scabrous on the margins; stipules broad and somewhat membranous, truncate, ciliate with 5–6 bristles $1\frac{1}{2}$–2 lin. long, brownish. *Flowers* numerous, densely crowded in the axils of the leaves, intermingled with numerous short bristles. *Calyx-lobes* 4, erect, $1\frac{3}{4}$–2 lin. long, $\frac{1}{2}$ lin. broad, slightly larger in fruit, lanceolate, acute, rigid, glabrous on both sides, scabrid-ciliate on the margins. *Corolla* 4-lobed, white; tube 2 lin. long, funnel-shaped, glabrous; lobes spreading, $1\frac{1}{2}$ lin. long, 1 lin. broad, oblong-ovate, obtuse, glabrous with the exception of a few hairs down the middle of the back. *Stamens* inserted in the sinuses between the corolla-lobes, exserted;

filaments $\frac{1}{3}$–$\frac{1}{2}$ lin. long, anthers $\frac{2}{3}$ lin. long. *Ovary* turbinate, compressed, pubescent on the upper part; style exserted, filiform; stigma shortly bifid. *Fruit* about $1\frac{1}{2}$ lin. long, compressed, oblong, pubescent on the upper part.

Kalahari Desert; near Bachakuru, *Lugard*, 233.

Allied to *S. Ruelliae*, DC., but is much more glabrous.

Compositae.

Erlangea misera, *S. Moore.*—*Bothriocline misera*, O. Hoffm.

Botletle Valley, *Lugard*, 209; Kwebe Hills, 3,300 ft., *Mrs. Lugard*, 217.

An erect annual, growing to 2 ft. high; flowers rich purple, or according to Mrs. Lugard's excellent drawing, blue-purple; evidently a handsome plant.

Vernonia fastigiata, *Oliv. & Hiern.*

Kwebe Hills, 3,000 ft., *Mrs. Lugard*, 162; Botletle Valley, *Lugard*, 204.

Plant growing to 2 ft. high; flowers purple.

Vernonia vitellina, *N. E. Br.*—*Gongrothamnus divaricatus*, Steetz in Peters, Reise Mossamb. Bot. p. 342; Hook. Ic. Pl. xii. t. 1140; Oliv. in Fl. Trop. Afr. iii., p. 401.

Okavango Valley, 3,000 ft., *Lugard*, 251; and also on the Kwebe Hills according to *Lugard*. Nyasaland: Zomba, *Sharpe*, 197. Portuguese East Africa: Lower valley of the River Shire, *Kirk*, and near Inhambane, *Peters*.

A luxuriant creeper with orange flowers.

I refer *Gongrothamnus* to *Vernonia* as I can find no structural characters whatever to distinguish them generically. The characters mentioned by Steetz and by Bentham do not hold good, for the style-branches are just the same as in those species of *Vernonia* in which the style-branches are flattened. The pubescence on their backs, however, although distinct, is more minute in *V. vitellina* than usual, whilst in *V. angolensis* (*Antunesia angolensis*, O. Hoffm.) it is quite as evident and as long as in many species recognised as belonging to *Vernonia*. There remains then only the colour of the flowers to separate these two genera. Hoffmann in *Engler & Prantl, Pflanzenfam.* iv. pt. 5, p. 126 has likewise united *Gongrothamnus* with *Vernonia*, but in *Engler Jahrbuch*, xxx. p. 433, (as noted in *Engler & Prantl, Pflanzenfam. Nachträge*, iii. zu iv. 4, p. 337) he has again separated *Gongrothamnus*, entirely on account of the flowers being yellow instead of red, white or blue. As I can find no distinction except colour I here refer all the species of *Gongrothamnus* to *Vernonia*, including also the genus *Antunesia*, which, as Hoffmann admits in Engler's *Jahrbuch* above quoted, is not generically separable. Therefore:—

Antunesia angolensis, O. Hoffm. =
Vernonia angolensis, *N. E. Br.*

Gongrothamnus angolensis, Hiern =
Vernonia lutea, *N. E. Br.*

" *aurantiacus*, O. Hoffm. =
Vernonia aurantiaca, *N. E. Br.*

Gongrothamnus conyzoides, Hiern =
Vernonia crassipetala, *N. E. Br.*

„ *Hildebrandtii*, Oliv. & Hiern =
Vernonia Hildebrandtii, *Vatke.*

„ *solidaginifolius*, Oliv. & Hiern =
Vernonia solidaginifolia, *Boj.*

„ *divaricatus*, Steetz =
Vernonia vitellina, *N. E. Br.*

Some of the specific names are changed because they are already used under *Vernonia.*

Vernonia senegalensis, *Less.*
Okavango Valley, about 3,000 ft., *Lugard*, 249 ; Botletle Valley, ex *Lugard.*
A bush, growing to 15 ft. high ; flowers cream-coloured, sweetly scented.

Vernonia ondongensis, *Klatt.*
Botletle River, 3,000 ft., *Mrs. Lugard*, 8 ; Okavango Valley, about 3,000 ft., *Lugard*, 250.
An annual, 5–6 ft. high ; flowers blue.

* **Nicolasia Lugardi**, *N. E. Br.* in Bull. Herb. Boiss. sér. 2, iv. p. 1015.
Okavango Valley, about 3,000 ft., growing in sand, *Lugard*, 252.

Nidorella resedifolia, *DC.* Two forms.
Botletle Valley, *Lugard*, 201 ; Kwebe Hills, 3,300 ft., *Mrs. Lugard*, 90.
Erect, growing to 3 ft. high ; flowers bright yellow.

Pluchea Leubnitziae, *N. E. Br.*—*Piptocarpha Leubnitziae*, O. Kuntze in Jahrb. Bot. Gart. Berl. iv. p. 265. *Pechuelloeschea Leubnitziae*, O. Hoffm. in Engler Jahrb. x. p. 274.
Bechuanaland : Keria, *Lugard*, 1A ; South Tropical Africa, *Baines.*
Hoffmann separates this plant generically from *Pluchea* on account of its habit, involucre, and 1-seriate female flowers. But the habit is scarcely distinct from that of some Indian and Australian species of *Pluchea*, whilst several species have quite the same kind of involucre, and the number of series of female florets varies.

Helichrysum argyrosphaerum, *DC.*
Okavango Valley, 3,000 ft., *Lugard*, 255.
Plant spreading, growing to 8 in. high ; flower-heads pink and white.

Helichrysum ericaefolium, *Less.* var.
Okavango Valley, 3,000 ft., *Lugard*, 254.
A sand-plant ; flowers white.

Helichrysum subglomeratum, *Less.*
Okavango Valley, 3,000 ft., *Lugard*, 253.
Plant growing to 3 ft. high ; flowers yellow.

Calostephane divaricata, *Benth.*
Kwebe, *Lugard*, 126 ; Kwebe Hills, 3,000 ft., *Mrs. Lugard*, 205.
An annual, from a few inches to 4 ft. high ; flowers yellow.

Philyrophyllum Schinzii, *O. Hoffm.*
Okavango Valley, 3,000 ft., *Lugard*, 257.
A bushy plant, growing to 6 ft. high; flowers yellow.

Geigeria Schinzii, *O. Hoffm.*
Okavango Valley? *Lugard*, 256.

Eclipta alba, *Hassk.*
Botletle Valley, in marshy places, *Lugard*, 211.
Flowers dirty white.

Melanthera varians, *Hiern.*
Botletle Valley, *Lugard*, 195.
Plant 3–4 ft. high; flowers bright yellow.

Bidens Schimperi, *Sch. Bip.* var.
Kwebe, *Lugard*, 177; Kwebe Hills, 3,300 ft., *Mrs. Lugard*, 177.
An erect annual, 3–4 ft. high; flowers bright yellow.

Senecio Schinzii, *O. Hoffm.*
North Kalahari Desert; near T'Klakane Pits, about 3,000 ft., *Lugard*, 228, and near Inkonane Pits, *Lugard*, 293.
An erect annual, growing to 2 ft. high; flowers pink.
This species appears to be dioecious or sub-dioecious, as on some specimens the flower-heads have involucres only 2–2½ lin. long and 1½ lin. in diam., and the achenes do not appear to be fertile; on other specimens the flower-heads have involucres 3–5 lin. long and 2½–3 lin. in diam., with fertile achenes.

Senecio longiflorus, *Oliv. & Hiern.*
Near Botletle, *Lugard*, 6; Kwebe, *Lugard*.
Grows among dry bush, usually 2–3 ft., sometimes 6 ft. high; flowers yellow.

Berkheya gorterioides, *Oliv. & Hiern.*
Kwebe, *Lugard*, 97; Kwebe Hills, 3,400 ft., *Mrs. Lugard*, 110.
An annual, 4–15 in. high; flowers yellow.

Dicoma Schinzii, *O. Hoffm.*
Near Chukutsa Salt-pan in the northern Kalahari Desert, *Lugard*, 222; Kwebe Hills, 3,300 ft., rare, *Mrs. Lugard*, 163.
Plant growing to 9 in. high; flowers dirty white.

Dicoma tomentosa, *Cass.*
Kwebe Hills, 3,300 ft., *Mrs. Lugard*, 216.
An erect annual, growing to 3 ft. high; flowers green.

Dicoma anomala, *Sond.*
Near Inkonane Pits, in the northern Kalahari Desert, about 3,000 ft., *Lugard*, 294.
Plant growing to 1 ft. high; flowers greyish-white.

Campanulaceae.

Wahlenbergia okavangensis, *N. E. Br.* *Herba* perennis, 7·5–25·4 cm. alta, basi ramosa. *Rami* erecti, graciles, superne laxe corymboso-ramosi, glabri. *Folia* erecta, 2–8 mm. longa, linearia vel subulata, acuta, minute calloso-denticulata, glabra vel pubescentia. *Calycis lobi* 2–2·7 mm. longi, subulati. *Ovarium* hemisphaericum, puberulum. *Corolla* 5–7 mm. longa, coerulea. *Capsula* trivalvis.

A small *perennial herb* 3–10 in. high, branching at the base. *Stems* erect, slender, loosely branching at the top into a corymbose inflorescence, glabrous or with a minute retrorse pubescence on the apical part. *Leaves* alternate, erect, scattered all along the stems and here and there collected in small dense rosettes, 1–4 lin. long, ¼–½ lin. broad, linear or subulate, acute, with thickened, minutely denticulate margins, glabrous or pubescent. *Pedicels* 1½–5 lin. long, glabrous or retrorsely puberulous. *Calyx* 5-lobed ; lobes 1–1⅓ lin. long, subulate, ascending, glabrous, minutely denticulate ; ovary about ½ lin. long, hemispherical, retrorsely puberulous. *Corolla* campanulate, blue, glabrous ; tube 2–2¾ lin. long ; lobes 1–1½ lin. long, deltoid, acute. *Capsule* about 1¼ lin. long, half-superior, 3-valved.

Okavango Valley, about 3,000 ft., a sand plant, *Lugard*, 258.

Allied to *W. Ecklonii*, Buek, but less leafy and with much shorter calyx-lobes.

Plumbagineae.

Plumbago zeylanica, *Linn.*

Banks of the Botletle River at Matabele Drift, *Lugard*, 5 ; Okavango Valley, about 3,000 ft., *Lugard*, 259.

Flowers white.

Ebenaceae.

Royena pallens, *Thunb.*

Lake River, *Lugard*, 19 ; Hackthorn Vley in the northern Kalahari Desert, about 3,000 ft., *Lugard*, 298.

A shrub, 8–10 ft. high ; flowers primrose-yellow, sweetly scented.

Oleaceae.

Jasminum mauritianum, *Boj.*

Okavango Valley, about 3,000 ft., *Lugard*, 230.

A creeper-bush ; flowers white, very sweetly scented.

Apocynaceae.

Adenium Lugardi, *N. E. Br.* *Planta* 15–20 cm. alta, minute pubescens. *Folia* erecta, longe lineari-oblonga, obtusa, apiculata, basi in petiolum brevem angustata. *Cymae* 2–4-florae, ubique dense pubescentes. *Pedunculi* et pedicelli breves. *Sepala* lanceolata, acuminata. *Corolla* rosea ; tubus 3–3·3 cm. longus, basi anguste cylindricus, superne infundibuliformi-ampliatus, extra pubescens, intra ad medium tantum pubescens ; lobi elliptici, acuti. *Antherae* dorso pubescentes, appendiculis linearibus contortis pubescentibus longe exsertis. *Ovarium* cum stylo glabrum.

A dwarf species 6–8 in. high. *Branches* with a minute spreading pubescence. *Leaves* erect, 2–4 in. long, 4–10 lin. broad, linear-oblong, obtuse, minutely apiculate, tapering at the base into a petiole 2–4 lin. long, more or less longitudinally folded, softly pubescent on both sides, but more densely beneath. *Cymes* appearing with the leaves, axillary and terminal, 2–4-flowered, densely white-pubescent from peduncle to calyx. *Peduncles* 1–3½ lin. long. *Bracts* 3–4 lin. long, subulate or lanceolate-subulate.

Pedicels 1–2½ lin. long. Sepals 4 lin. long, 1½ lin. broad, lanceolate, acuminate. *Corolla* "pink, very waxy" (*Lugard*); tube 1¼–1⅓ in. long, pubescent outside and at the middle part within where the filaments of the stamens are decurrent, the base inside is quite glabrous, and the upper, funnel-shaped part is minutely papillate, but can scarcely be called puberulous; lobes 8–9 lin. long, ½ in. broad, elliptic-ovate, acute, glabrous within, puberulous on one half on the back. *Filaments* of the stamens 1¼–1⅓ lin. long, densely pubescent; anthers about 3 lin. long, pubescent on the back, their appendages ½ in. long, much exserted, linear, pubescent, all twisted together.

Bechuanaland; Palapye, 3,000 ft., *Lugard*, 269.

A distinct species, well characterised by its dwarf habit and erect strap-shaped leaves.

Carissa tomentosa, *A. Rich.*

Lake River, *Lugard*, 16.

A creeper-like tree, 20 ft. high; flowers pinkish-white.

Asclepiadaceae.

***Raphionacme lanceolata**, *Schinz*, var. **latifolia**, *N. E. Br.* in Fl. Trop. Afr. iv., 1, p. 274.

Kwebe Hills, 3,200 ft., *Lugard*, 69, 98; *Mrs. Lugard*, 71; northern Kalahari Desert, near Chukutsa Salt-pan, 3,000 ft., *Lugard*, 260.

The stems apparently spring up from a succulent root, growing to 2 or 3 ft. high; flowers greenish or grey-green, or mauve and green.

***Schizoglossum aciculare**, *N. E. Br.* in Fl. Trop. Afr. iv., 1, p. 363.

Near Kwebe, *Lugard*, 82.

***Asclepias rostrata**, *N. E. Br.* in Fl. Trop. Afr. iv., 1, p. 331.

Lake Ngami, *Lugard*, 22; Okavango Valley, about 3,000 ft., *Lugard*, 231.

A bush, 3–5 ft. high; flowers creamy-white, with light green corona. It grows only on the dry shore of the lake or river.

Pachycarpus concolor, *E. Mey.*

Bechuanaland; near Palapye, 3,000 ft., *Lugard*, 261.

Plant about 1 ft. high, erect; flowers green and brown.

Pentarrhinum insipidum, *E. Mey.*

Grassy plains near Botletle River, *Lugard*, 217.

Flowers chocolate and green.

Sarcostemma viminale, *R. Br.*

Kwebe Hills, 3,300 ft., *Mrs. Lugard*, 185.

A creeper, climbing to a height of 20 ft.; corolla green, corona white; fruit brown, spotted with green.

Pergularia extensa, *N. E. Br.* (*Doemia extensa*, R. Br.): *vide* Kew Bulletin, 1907, 323.

Botletle Valley, *Lugard*, 200; Kwebe Hills, 3,300 ft., *Mrs. Lugard*, 202.

A very succulent and milky creeper; corolla light green, corona white.

Marsdenia zambesiaca, *Schlechter*.
Kwebe, *Lugard*, 60; Kwebe Hills, 3,000–3,500 ft., *Mrs. Lugard*, 17.
A creeper, with a very milky stem; flowers green, according to Lugard, creamy white according to Mrs. Lugard.

*Fockea Lugardi, *N. E. Br.* in Fl. Trop. Afr. iv., 1, p. 429.
Kwebe Hills, 3,000 ft., *Lugard*, 299.
Creeping over rocks; flowers green.

Orthanthera jasminiflora, *N. E. Br.*
Lake Ngami, *Lugard*, 23.
Creeps on sandy soil, with trailers 6 ft. long; flowers cream-coloured, strong-scented.

*Ceropegia Lugardae, *N. E. Br.* in. Fl. Trop. Afr. iv., 1, p. 455.
Kwebe Hills, 3,000 ft., *Mrs. Lugard*, 262.
Flowers green, spotted with purple-brown outside.

*Ceropegia kwebensis, *N. E. Br.* in Fl. Trop. Afr. iv., 1, p. 456.
Kwebe Hills, 3,400 ft., apparently rare, *Mrs. Lugard*, 116.
Creeping on rocks; corolla green outside, with purplish hairs on the lobes.

*Ceropegia floribunda, *N. E. Br.* in Fl. Trop. Afr. iv., 1, p. 460.
Kwebe Hills, 3,000 ft., very rare, *Mrs. Lugard*, 161.
A creeper; corolla green tinted with purplish at the base.

*Caralluma atrosanguinea, *N. E. Br.* in Fl. Trop. Afr. iv., 1, p. 485.
Northern Kalahari Desert, *Lugard*, 263.
Flowers mauve according to Lugard, but a plant grown from a half-dried portion of Lugard's specimen produced flowers of an intense blackish-crimson.

*Caralluma lateritia, *N. E. Br.* in Fl. Trop. Afr. iv., 1, p. 486.
Botletle flats, near Tame's and Rakop's Villages, about 3,000 ft. *Lugard*, 307.
Grows to 9 inches high; flowers brick-red.

*Caralluma Lugardi, *N. E. Br.* in Fl. Trop. Afr. iv., 1, p. 487.
Totin, near Lake Ngami, *Lugard*, 74.
Flowers bright chocolate.

*Caralluma maculata, *N. E. Br.* in Fl. Trop. Afr. iv., 1, p. 487.
Near T'Klakane Pits, in the northern Kalahari Desert, about 3,000 ft., *Lugard*, 297.
Grows 3–4 inches high; flowers green, spotted with dark claret.

*Hoodia Lugardi, *N. E. Br.* in Fl. Trop. Afr. iv., 1, p. 491.
Chukutsa Salt-pan, northern Kalahari Desert, *Lugard*, 303.
Plant growing to 2½ ft. high, erect, thorny; flowers brick-red.

*Stapelia kwebensis, *N. E. Br.* in Fl. Trop. Afr. iv., 1, p. 501.
Kwebe Hills, 3,200 ft. *Lugard*, 112; *Mrs. Lugard* 29.
Flowers varying from maroon to ochre.

Gentianaceae.

Enicostemma littorale, *Bl.*
Near Backakuri, in the Kalahari Desert, *Lugard*, 235 ; Kwebe Hills, 3,000 ft., apparently rare, *Lugard*, 87 ; *Mrs. Lugard*, 199.
Plant growing to 6 in. high ; flowers white or orange.

Boragineae.

Ehretia mossambicensis, *Klotzsch.*
Kwebe Hills, 3,400 ft., *Lugard*, 36, 37 ; *Mrs. Lugard*, 48.
A shrub, 3–12 ft. high ; flowers bluish-white, lilac, or mauve.

Heliotropium ovalifolium, *Forsk.*
Lake River, *Lugard*, 193 ; Kwebe Hills, 3,300 ft., *Lugard*, 76 ; *Mrs. Lugard*, 151.
This plant grows only in swampy places, and attains a height of about 13 in. ; foliage silvery-green ; flowers white.

Heliotropium strigosum, *Willd.*
Kwebe, *Lugard*, 149.
Flowers white.

***Heliotropium dissimile**, *N. E. Br.* in Fl. Trop. Afr. iv., 2, p. 42.
Kwebe Hills, 3,400 ft. In dry sandy places, *Lugard*, 139 ; *Mrs. Lugard*, 77.

Convolvulaceae.

Ipomoea angustifolia, *Jacq.*
Botletle Valley, *Lugard*, 207 ; Kwebe Hills, 3,300 ft., *Mrs. Lugard*, 133.
Creeping on the ground ; flowers yellow.

Ipomoea adenoides, *Schinz.*
Near Chukutsa Salt-pan in the Northern Kalahari Desert, *Lugard*, 224 ; near Palapye, *Lugard*, 265.

Ipomoea chloroneura, *Hallier f.*
Botletle Valley, *Lugard*, 190.
Flowers white.

Ipomoea cardiosepala, *Hochst.*
Kwebe Hills, 3,000 ft., *Lugard*, 125 ; *Mrs. Lugard*, 159. Kobis to North Shaw Valley, *Baines.*
A ground-creeper ; flowers white, with a radiating purple centre

Ipomoea ochracea, *G. Don* var.
Kwebe Hills, 3,400 ft., *Mrs. Lugard*, 114.
A creeper ; flowers creamy-yellow or ochreous.

Ipomoea lilacina, *Bl.* (*I. Lindleyi*, Choisy).
Without precise locality, *Lugard*, 300.

Ipomoea pilosa, *Sweet.*
Kwebe Hills, 3,300 ft., *Mrs. Lugard*, 223.
A creeper, with milky sap ; flowers deep mauve.

Ipomoea Bolusiana, *Schinz* (*Ipomoea angustisecta*, Engl.).

Near T'Klakane Pits, in the Northern Kalahari Desert, *Lugard*, 225 ; Botletle Valley, *Lugard*, 264.

Creeping on the ground ; flowers purple-pink.

Ipomoea Magnusiana, *Schinz*.

Kwebe, very common, *Lugard*, 119 ; Kwebe Hills, 3,400 ft., *Mrs. Lugard*, 135.

Creeping on the ground ; flowers white.

Ipomoea kwebensis, *N. E. Br. Caulis* longissime volubilis, glaber. *Folia* petiolata, ad basin palmatisecta, 5–7-loba, glabra, lobis lanceolatis acutis. *Pedunculi* breves, 1–3-flori, glabri. *Sepala* ovata, acuta, dorso scabrido-tuberculata. *Corolla* 18–20 mm. longa, roseo-purpurea, glabra. *Semina* dense velutino-pubescentia. *I. quinquefolia*, var. *purpurea*, Hallier f. in Bull. Herb. Boiss, vi. 546.

Glabrous in all parts, with the exception of the seeds. *Stem* rather slender, very long, twining. *Leaves* palmately divided to the base into 5–7 lobes ; when 7-lobed, the two basal lobes are much smaller than the rest and adnate to the adjacent lobe for a quarter to a third of their length, all lanceolate, acute, tapering below to an acute base, the larger 1½–2 in. long, 6–8 lin. broad ; petioles ¾–1¼ in. long, nearly or quite without tubercle-like glands. *Peduncles* ¼–½ in. long, 1–3-flowered. *Bracts* ½–¾ lin. long, subulate. *Pedicels* 4–6 lin. long. *Sepals* 2½–3 lin. long, 1–1⅓ lin. broad, ovate, acute, tuberculate on the back. *Corolla* 9–10 lin. long, about 1 in. in expanse, deep mauve. *Capsule* 3½ lin. long, 3 lin. in diam. *Seeds* densely velvety-pubescent.

Kwebe Hills, 3,300 ft., *Mrs. Lugard*, 218.

Although this plant is exceedingly like *I. quinquefolia*, Hochst., in foliage and flower, it is so entirely different in habit, being in all probability a perennial, with very long twining stems, nearly or quite glandless petioles and purple flowers, besides coming from quite a different geographical area, that I cannot follow Hallier in considering it to be a variety of *I. quinquefolia*, Hochst. The latter is an annual, with short prostrate stems that show no tendency to twine, gland-tuberculate petioles, white flowers, and has hitherto only been found in Abyssinia. *I. quinquefolia*, var. *pubescens*, of the Flora Capensis is entirely different in foliage and calyx from the Abyssinian plant as well as from *I. kwebensis*.

Ipomoea verecunda, *N. E. Br.* *Caulis* prostratus, tenuiter puberulus. *Folia* petiolata, palmatim 7–9-loba, supra glabra, subtus parce pubescentia ; lobi lineari-oblongi, anguste oblongo-lanceolati vel obovato-spathulati, acuti vel obtusi, apiculati, basi angustati. *Pedunculi* 1-flori, prope apicem bibracteolati. *Sepala* late ovata, obtusa vel subacuta, pubescentia, atropurpureo-nervosa. *Corolla* quam calyx paullo longior, 1·8 cm. diametro, alba, tubo brunneo-purpureo, glabro. *Merremia verecunda*, Rendle in Fl. Trop. Afr. iv., 2, p. 110.

Stems procumbent, rather slender, very thinly puberulous. *Leaves* petiolate, 1¼–2½ in. in diam., deeply palmately 7–9-lobed, glabrous above, thinly pubescent beneath and on the ½–1 in. long petioles ; lobes 8–15 lin. long, 2–5 lin. broad, linear-oblong, narrowly oblong-lanceolate or spathulate-obovate, acute or obtuse, apiculate, tapering at the base into the very short portion of the leaf

by which they are connected, apparently more or less folded lengthwise. *Peduncles* 1½–2¾ in. long, one-flowered, bibracteolate ⅓–⅔ in. below the calyx, thinly pubescent below the bracteoles, rather densely so above them. *Bracteoles* 3–4 lin. long, linear or linear-lanceolate, acute, thinly pubescent. *Sepals* 4–4½ lin. long, about 3 lin. broad, ovate, obtuse or subacute, softly pubescent, pale green, with six to seven purple-brown nerves. *Corolla* about one-third longer than the calyx, 5–6 lin. long, about ¾ in. in diam., glabrous, white, with a purple-brown or chocolate-coloured centre. *Stigmas* didymous, with globose lobes. *Seeds* 2 lin. in diam., blackish, smooth, glabrous, ciliate on the angles with minute flattened hairs.

Kwebe Hills, 3,400 ft., comparatively rare, *Mrs. Lugard*, 134 ; northern Kalahari Desert, near T'Klakane Pits, *Lugard*, 227.

Allied to *I. Magnusiana*, Schinz, differing in having the leaves green (not white) beneath, and in the broader-veined sepals.

According to Mrs. Lugard's note on the label, the corolla frequently does not expand fully. The calyx is not unlike that of *Hibiscus Trionum*, Linn., in miniature.

***Ipomoea Lugardi**, *N. E. Br.* in Fl. Trop. Afr. iv., 2, p. 163.

Kwebe Hills, 3,300 ft., *Mrs. Lugard*, 211 ; Bechuanaland : Eastern Bamanguato Country ; between Henry's Vley and Tamasetze, *Holub*, 1062 ; northern Kalahari Desert, near T'Klakane Pits, *Lugard*, 226.

Ipomoea kentrocaulos, *Clarke* var. **pinnatifida**, *N. E. Br. Folia* 7-lobata, lobis pinnatifidis. *Pedunculi* 1–2-flori. *Bracteae* saepe foliosae, sessiles vel petiolatae, lobatae, lobis pinnatifidis. *Merremia kentrocaulos*, Rendle, var. *pinnatifida*, Rendle in Fl. Trop. Afr. iv., pt. 2, p. 103.

Plant *perennial*, trailing, similar to the typical form, differing in having the lobes of the leaves deeply pinnatifid and the bracts often (always ?) more or less like the leaves, being divided and pinnatifidly lobed in the same way, petiolate or sessile, but smaller. *Flowers* creamy-white, brownish-crimson in the tube.

Kwebe Hills, 3,300 ft., *Mrs. Lugard*, 82.

Dr. Rendle has attributed the authority of this variety under *Merremia* to myself, but I do not recognise *Merremia* as distinct from *Ipomoea*.

Ipomoea dissecta, *Willd.*

Kwebe Hills, 3,300 ft., *Mrs. Lugard*, 140.

Creeping on the ground ; flowers white.

***Ipomoea calcarata**, *N. E. Br.* in Fl. Trop. Afr. iv., 2, p. 180.

Kwebe Hills, 3,300 ft., *Lugard*, 182 ; *Mrs. Lugard*, 208.

This very distinct species is nearly allied to *I. odontosepala*, Baker, but has flowers only half the length and half the diameter of those of that species. According to Mrs. Lugard, the "flower opens with sunrise and rapidly closes."

Ipomoea pinnata, *Hochst.*

Kwebe Hills, only found among rocks, comparatively rare, 3,300 ft., *Lugard*, 248 ; *Mrs. Lugard*, 176.

Trailing ; flowers bright yellow.

Astrochloena lachnosperma, *Hallier f.*

Kwebe Hills, 3,300 ft., *Mrs. Lugard*, 91.

An erect annual, 1–1½ ft. high ; flowers white, with a magenta centre.

*Jacquemontia capitata, *G. Don* var. pauciflora, *N. E. Br.* in Fl. Trop. Afr. iv., 2, p. 86.
Very common at Kwebe, scarcely any in Botletle Valley, *Lugard*, 183 ; Kwebe Hills, 3,300 ft., *Mrs. Lugard*, 169.

Convolvulus sagittatus, *Thunb.* var.
Near Kwebe, *Lugard*, 77.
Flowers white.

Evolvulus alsinoides, *Linn.*
Kwebe Hills, 3,400 ft., *Lugard*, 141 ; *Mrs. Lugard*, 99.
Annual, growing to 8 in. high ; flowers bright blue.

Breweria suffruticosa, *Schinz* (*Seddera suffruticosa*, Hallier f.).
Kwebe Hills, 3,000 ft., *Lugard*, 184 ; *Mrs. Lugard*, 203.
Plant spreading on the ground ; flowers white.
There appears to me no valid reason for distinguishing *Seddera* from *Breweria*.

Solanaceae.

Solanum incanum, *Linn.*
Kwebe Hills, 3,300 ft., *Mrs. Lugard*, 18.
A thorny perennial, almost evergreen ; flowers mauve ; fruit globose, 1¼–1½ in. in diam., yellow.

Solanum panduraeforme, *E. Mey.*
Kwebe Hills, 3,300 ft., *Lugard*, 55 ; *Mrs. Lugard*, 19.
A thornless perennial, sheds its leaves readily ; flowers purple-mauve ; fruit globose, ¾–1 in. in diam., yellow.

*Solanum kwebense, *N. E. Br.* in Fl. Trop. Afr. iv., 2, p. 225.
Kwebe Hills, 3,300 ft., *Lugard*, 50 ; *Mrs. Lugard*, 62.

Scrophulariaceae.

Aptosimum lineare, *Marl. & Engl.*
Near T'Klakane Pits in the northern Kalahari Desert, *Lugard*, 230.
Flowers deep purple-blue.

Aptosimum decumbens, *Schinz.*
Okavango Valley, about 3,000 ft., *Lugard*, 266.
Creeping on the ground ; flowers purple.

*Peliostomum Lugardae, *N. E. Br.* in Fl. Trop. Afr. iv., 2, p. 275.
Kwebe Hills, 3,400 ft., *Mrs. Lugard*, 124.

Lyperia atropurpurea, *Benth.*
Botletle Valley, *Lugard*, 267.

Lyperia canescens, *Benth.*
Botletle Valley, *Lugard*, 268.

Alectra parvifolia, *Schinz.*
Kwebe, *Lugard*, 171 ; near Makarukaru Valley, 33 miles south-east of Kwebe, 3,300 ft., *Mrs. Lugard*, 186.
Flowers orange-yellow, veined with russet-brown.

Alectra Vogelii, *Benth.* var.
Botletle Valley, *Lugard*, 210.
Flowers bright yellow.

Striga orobanchoides, *Benth.*?
Kwebe Hills, 3,300 ft., *Lugard*, 127 ; *Mrs. Lugard*, 164.
Grows on the roots of small annuals. The plant turns black if bruised. The flowers vary in colour from pure white to mauve and dark purple.

Striga Thunbergii, *Benth.*
Okavango Valley, about 3,000 ft., *Lugard*, 270.
Found in inundated places ; flowers purple.

Rhamphicarpa tubulosa, *Benth.*
Bank of Botletle River at Matabele Drift, *Lugard*, 4 ; Okavango Valley, about 3,000 ft., *Lugard*, 271.
On inundated or damp ground, erect, growing to 2 ft. high ; flowers bright pink.

Sopubia Dregeana, *Benth.*
Okavango Valley, about 3,000 ft., *Lugard*, 272.
On inundated ground, growing to 2 ft. high ; flowers mauve.

Bignoniaceae.

Markhamia acuminata, *K. Schum.*
Kwebe Hills, 3,200–3,500 ft., *Lugard*, 58 ; *Mrs. Lugard*, 55.
A tree 10–20 ft. high, never seems to attain more than a few inches in girth ; the flowers vary from russet to maroon—according to Mrs. Lugard's drawing they are dark brownish-crimson on the lobes, and whitish, spotted with purple-brown in the tube ; fruit a long brown pod.

Rhigozum brevispinosum, *O. Kuntze.*
Kwebe Hills, 3,400 ft., *Lugard*, 35 ; *Mrs. Lugard*, 46.
A thorny shrub, 4–8 ft. high ; flowers bright yellow.

Catophractes Alexandri, *Don.*
Kwebe Hills, 3,000 ft., *Lugard*, 65 ; *Mrs. Lugard*, 83.
A shrub, 5–6 ft. high ; foliage whitish ; flowers pure white ; fruit silvery-green.

Kigelia pinnata, *DC.* var. **tomentella**, *Sprague.*
Okavango Valley, at Bakalahari Village, about 3,000 ft., *Lugard*, 233.
A tree, growing to 30 ft. high ; flowers rich claret-coloured, with yellowish stamens ; fruit the shape of a " Bologna sausage " attaining sometimes a length of 3 ft., brown, hanging from a rope-like stalk generally longer than the fruit.

Pedalineae.

* **Pterodiscus ngamicus**, *N. E. Br.* in Fl. Trop. Afr. iv., 2, p. 543.
Kwebe Hills, 3,000 ft., *Lugard*, 136A.
Allied to *P. luridus*, Hook. f., but has very much larger fruit. According to a note made by Mrs. Lugard upon her drawing of

the plant, the rootstock produces a very "glutinous transparent exudation, through the incision of new growth."

Harpagophytum procumbens, *DC.*

Botletle Valley, *Lugard*, 212; Kalahari Desert; Kwebe to Palapye, 3,000 ft., *Lugard*, 273.

Creeping on the ground; flowers deep purple or magenta, white at the base.

Holubia saccata, *Oliv.*

Near Mamunwe in the Kalahari Desert, *Lugard*, 240.

Flowers greenish-yellow.

***Sesamothamnus Lugardi**, *N. E. Br.* in Fl. Trop. Afr. iv., 2, p. 568.

Northern Kalahari desert, near Chukutsa Salt-pan, 3,000 ft. *Lugard*, 274. South-west Africa, without precise locality, at latitude 23°, *Chapman & Baines.*

Sesamum grandiflorum, *Schinz.*

Kwebe Hills, 3,300 ft., *Lugard*, 111; *Mrs. Lugard*, 172.

An erect annual, growing to 5 ft. high; flowers white, light lilac or dull mauve in various shades, with the inside of the tube dark mauve-purple. Said to be a remedy for snake bites; the leaves rubbed on the affected part are said to draw out the pain and produce a blister. The native name is 'Dhobi.'

Sesamum alatum, *Thonn.*

Botletle Valley, *Lugard*, 188.

"Flowers lake-colour?"

Ceratotheca triloba, *E. Mey.*

Mamunwe, in the Kalahari Desert, *Lugard*, 241.

Flowers purplish-white.

Pretrea eriocarpa, *Decne.*

Botletle Valley, *Lugard*, 208, 275.

Creeping on the ground; flowers light purple.

Acanthaceae.

Thunbergia aurea, *N. E. Br.* *Annua*, erecta vel scandens, pubescens. *Folia* alato-petiolata, deltoideo-ovata, acuta, dentata, basi subtruncata, acuto-angulata. *Pedunculi* 2·5–5 cm. longi. *Bracteae* elongato-ovatae, acutae, integrae, basi cordatae. *Calycis dentes* subulati. *Corolla* omnino aurantiaca, 1·6–1·8 cm. diam.; tubus 14–18 mm. longus, anguste infundibuliformis.

Annual. *Stem* at first erect, becoming twining, growing to 2 ft. in height, pubescent with long and short spreading hairs. *Leaves* somewhat spreading, thin, herbaceous, pubescent; petiole 1–2 in. long, winged, 1–2 lin. broad; blade 1½–3½ in. long, 1–2½ in. broad, deltoid-ovate, acute, toothed on the margins, truncate or subhastate at the base, with acute outer angles, 5-nerved. *Peduncles* solitary, from both axils, 1–2 in. long, pubescent. *Bracts* ¾ in. long, 4–5 lin. broad, rather larger when in fruit, ovate, acute, cordate at the base, shortly wing-keeled at the base on the back, pubescent. *Calyx-teeth* several, 1–1½ lin. long, subulate, pubescent. *Corolla* entirely (tube and limb) orange-yellow, glabrous outside, bearded at the

insertion of the stamens and minutely pubescent in the throat and around the mouth of the tube within; tube 7–9 lin. long, tubular-infundifuliform, about 2½ lin. in diam. at the top; limb speading, 8-9 lin. in diam.; lobes subequal, 3½–4 lin. long and broad, very obtuse or slightly emarginate. *Stamens* included, about 3 lin. long; filaments glabrous; anther-cells subequal, both of them spurred and bearded at the base only. *Style* as long as the stamens, filiform, glabrous; stigma unequally 2-lobed; lobes with incurved sides, so that each of them is somewhat obliquely funnel-shaped.

Kwebe Hills, 3,400 ft. *Lugard*, 114; *Mrs. Lugard*, 107.

Allied to *T. alata*, Boj., but differs in having much smaller flowers, which are entirely orange-yellow, not purple in the tube. The anthers are bearded at the base only, not to ⅔ of the way up as they are in *T. alata*, and the hairs are different.

Ruellia prostrata, *T. And.*

Kwebe Hills, 3,300 ft., *Mrs. Lugard*, 89.

A perennial, growing to 2 ft. high; flowers mauve.

Ruellia patula, *Jacq.* (*fide* C. B. Clarke).

Kwebe Hills, 3300 ft., *Lugard*, 45, 49, 68; *Mrs. Lugard*, 63.

A dwarf perennial, 6–12 in. high; flowers white (Nos. 45 and 63), or purple (Nos. 49 and 68).

***Ruelliopsis setosa**, *C. B. Clarke* in Fl. Trop. Afr. v., p. 59.

Northern Kalahari Desert near Chukutsa Salt-pan, *Lugard*, 220; near T'Klakane Pits, *Lugard*, 245.

Flowers light purple.

Petalidium latifolium, *C. B. Clarke.*

Kwebe, *Lugard*, 121; plains near Kwebe Hills, 3,000 ft., *Mrs. Lugard*, 12.

Perennial, 2–3 ft. high, with soft silvery foliage; upper four lobes of the corolla brick-red, lower lobe yellow, according to Mrs. Lugard's drawing.

Blepharis diversispina, *C. B. Clarke.*

Near Chanokha, by the Botletle River and also on the Kwebe Hills, 3,000–3,300 ft., *Mrs. Lugard*, 6.

Perennial; flowers blue.

Blepharis serrulata, *Ficalho & Hiern.*

Kwebe, *Lugard*, 85.

Barleria macrostegia, *Nees.*

Near Inkonane Pits in the northern Kalahari Desert, about 3,000 ft., *Lugard*, 295.

Grows to 6 in. high; flowers blue.

Barleria Mackenii, *Hook. f.*

Kwebe, *Lugard*, 124.

Flowers blue.

Barleria spathulata, *N. E. Br.* *Folia* petiolata, lanceolata vel elliptica, acuta, basi acuta, glabra; axillae spinulosae. *Spicae* pluriflorae. *Bracteae* spathulato-obovatae, obtusissimae vel emarginatae, brevissime mucronulatae, albo-pruinosae. *Sepala* 4, lanceolato-attenuata, acutissima. *Corolla* subbilabiata, aurantiaco-lutea. *Stamina* 2.

Stem terete, glabrous, branching. *Leaves* 2–4 in. long, ½–1¾ in. broad, lanceolate elliptic or oblong-lanceolate, acute, acutely tapering into a short petiole at the base, glabrous and green on both sides; axils often furnished with a pair or a tuft of four slender bristle-like spines 1½–2 lin. long. *Flower-spikes* 1¼–2½ in. long, about ¾ in. in diam.; excluding the lower corollas, dense, many-flowered. *Bracts* imbricate, 5–7 lin. long, 2–5 lin. broad near the apex, spathulate-obovate or cuneate-obovate, very obtuse or slightly emarginate at the slightly recurved, very shortly mucronulate apex, slightly complicate, rather rigid, prominently 3–5-nerved on the back, white-pruinose on both sides, glandular on the back, adpressed-pubescent on the nerves and ciliate on the margins, with moderately long hairs, thinly and minutely puberulous on the inner face. *Bracteoles* ½ in. long, ¾ lin. broad, linear, pungent-acute, keeled and adpressed-pubescent on the back, ciliate. *Sepals* four, about 5 lin. long, the outer 2 lin., the inner 1 lin. broad at the base, lanceolate, attenuate to a very acute, almost pungent point, glandular on the back in the upper part, otherwise glabrous. *Corolla* orange-yellow, puberulous outside and about the insertion of the stamens within the tube, subbilabiate, the limb being divided so that one lobe is free from the tube about ¼ in. below the other four; tube ½ in. long, narrow cylindric; lobes 5 lin. long, 3–3½ lin. broad, elliptic-oblong, obtuse. *Stamens* two, inserted above the middle of the corolla-tube, 6–7 lin. long, exserted; filaments filiform, slightly puberulous; anthers obtusely sagittate, 1⅓ lin. long; cells equal. *Ovary* and the filiform style glabrous; stigma obscurely conical, with a very slightly marked ring around its base.

Kwebe, 3,300 ft., *Mrs. Lugard*, 5A.

Another specimen, No. 5, collected by Mrs. Lugard by the Botletle River, at Moremi's Drift, is considered by her to belong to the same species. If this is the case, it was probably gathered from a starved plant, as most of the leaves have fallen and the flower-spikes are reduced to 1–4 flowers, which although similar in form and colour are smaller than in the plant I have described; the bracts also are mostly acute and not whitened beneath. The material, however, is too unsatisfactory for exact determination.

B. spathulata is allied to *B. Prionitis*, Linn., but very distinct in appearance, being readily recognised by its very obtuse, cuneate-obovate, pruinose bracts, smaller corolla, and by the stamens being inserted towards the top of the corolla-tube and not at the middle as they are in *B. Prionitis*, Linn.

***Barleria Lugardii**, *C. B. Clarke* in Fl. Trop. Afr. v., p. 161.
Kwebe Hills, 3,300 ft., *Lugard*, 128; *Mrs. Lugard*, 106.
Perennial, 1–1½ ft. high; flowers white.

Crabbea velutina, *S. Moore.*
Kwebe Hills, 3,300 ft., *Lugard*, 131; *Mrs. Lugard*, 96.
Perennial, growing under rocks and trees, in shade; flowers white.

Justicia leptocarpa, *Lindau.*
Kwebe Hills, 3,200 ft., *Lugard*, 129; *Mrs. Lugard*, 138.
Annual, growing to a foot in height; flowers pale mauve, spotted with darker mauve.

Justicia odora, *Vahl.*

Near Kwebe, *Lugard*, 72 ; Kwebe Hills, 3000 ft., *Mrs. Lugard*, 160.

Perennial, growing to 2 ft. high ; flowers yellow.

Monechma Nepeta, *C. B. Clarke.*

Kwebe Hills, 3,300 ft., *Lugard*, 172 ; *Mrs. Lugard*, 131.

Perennial, growing to 2 ft. high ; flowers pale mauve or purplish-white.

Monechma bracteatum, *Hochst.*

Kwebe Hills, 3,300 ft., *Mrs. Lugard*, 192.

Annual, growing to 15 in. high ; flowers purple, with a white throat to the tube.

Ecbolium Lugardae, *N. E. Br.* *Fruticulus* ramosus usque ad 45 cm. altus. *Rami* pilis crispulis minutis recurvo-patentibus puberuli. *Folia* valde patula vel deflexa, herbacea, supra saturate viridia, petiolo 2–5 mm. longo ; lamina 3·5–6 cm. longa, 8–22 mm. lata, lanceolata, longe acuminata, utrinque parcissime puberula vel fere glabra. *Bracteae* dense imbricatae, 12–18 mm. longae, 7–13 mm. latae, ovatae vel ellipticae, acutae, spinulo 1·5–2 mm. longo hamato-mucronatae, ciliatae. *Calyx* 5-lobus ; tubus 2–2·5 mm. longus ; lobi 4–6 mm. longi, anguste lanceolati, setuloso-attenuati, pilis simplicibus ciliati. *Corolla* bilabiata, coerulea ; labium superius oblongo-lanceolatum, obtusum, minutissime bifidum ; labium inferius profunde 3-lobum, lobis oblongo-lanceolatis obtusis.

A much branched *shrublet*, about 18 in. high. *Branches* puberulous with spreading recurved or somewhat curly hairs. *Leaves* very spreading or deflexed, thin, herbaceous, nearly glabrous or with a minute very scattered inconspicuous pubescence on both sides ; petiole 1–2½ lin. long ; blade 1⅓–2⅓ in. long, 4–11 lin. broad, lanceolate, long-acuminate, acute, rounded to acutely cuneate at the base, dark green above, pale green beneath. *Spikes* 1–2¼ in. long, densely 8–20-flowered. *Bracts* imbricate, 6–9 lin. long, 3½–6½ lin. broad, ovate or elliptic, rather abruptly and acutely narrowed into a pungent recurved hooked spine-like tip ¾–1 lin. long, with reflexed margins at the base, slightly rough to the touch, ciliate. *Bracteoles* 1½–2 lin. long, subulate, subspinous. *Calyx* 5-lobed ; tube 1–1¼ lin. long, lobes 2–3 lin. long, narrowly lanceolate, attenuate to a fine almost bristle-like point, ciliate with simple hairs and with a few gland-tipped hairs down the back. *Corolla* 2-lipped, light blue ; tube about 5½ lin. long ; upper lip of one oblong-lanceolate lobe about 13 mm. long and 1½–1¾ lin. broad, very minutely notched at the obtuse apex ; lower lip of 3 lobes 5½–6 lin. long, 1¾ lin. broad, oblong-lanceolate, obtuse. *Stamens* 2, exserted ; anthers oblong, equally 2-celled, obtuse at the base, yellow. *Disk* cupular, truncate. *Ovary* ovoid, glabrous ; cells 2-ovulate ; style filiform, glabrous ; stigma minutely 2-lobed.

Kwebe Hills, 3,300 ft., *Mrs. Lugard*, 212.

Mrs. Lugard notes that the flowers of this plant close at noon.

Ecbolium cognatum, *N. E. Br.* Valde affinis *E. Lugardae*, N. E. Br. *Rami* minute adpresse incano-pubescentes. *Folia* adscendentia, subcoriacea, siccata flavo-viridia, petiolo 1–3 mm. longo ; lamina 2–4 cm. longa, 5–11 mm. lata, lanceolata vel anguste lanceolata,

apice acuta vel obtusa, basi cuneata, utrinque parcissime et minute pubescens vel fere glabra. *Bracteae* 15–20 mm. longae, 5–10 mm. latae, ovatae, apice in spinulam recurvo-hamatam 3 mm. longam attenuatae, ciliatae. *Calycis tubus* 1·5–2 mm. longus; lobi 5–6·5 mm. longi, lanceolato-attenuati, pilis glanduliferis pubescentes et ciliati. *Flores* iis *E. Lugardae* similes.

A small compactly branched *shrublet*, up to 1 ft. high, closely allied to *E. Lugardae*, N. E. Br., with the branches more ascending and more leafy and their pubescence more minute, denser and closely adpressed. *Leaves* ascending, subcoriaceous, concolorous, yellowish-green; petiole ½–1½ lin. long; blade ¾–1⅔ in. long, 2½–5½ lin. broad, lanceolate or sometimes almost linear-lanceolate, acute or obtuse, cuneate at the base, nearly glabrous or very thinly sprinkled with minute hairs above and puberulous on the veins beneath. *Spikes* and *flowers* almost as in *E. Lugardae*, but the bracts longer, narrower and more acuminate, ⅔–¾ in. long, 2½–5 lin. broad, ovate, gradually tapering into a pungent recurved hooked spine-like tip 1½ lin. long. *Calyx-tube* ¾–1 lin. long; lobes 2½–3¼ lin. long, lanceolate-attenuate to a fine point, but scarcely bristle-like, ciliate and pubescent on the back with gland-tipped hairs. *Corolla* bright sky-blue.

Northern Kalahari Desert; near Chukutsa Salt-pan, *Lugard*, 223.

In the Flora of Tropical Africa v., p. 239, this plant is quoted under *E. hamatum*, Clarke, which was founded upon *Blechum hamatum*, Klotzsch, but according to Klotzsch's original description widely differs from *E. cognatum*, in having membranous leaves, dark green above and paler beneath and obovate bracts, besides being a native of a widely different region. *E. hamatum*, *E. cognatum* and *E. Lugardae* are doubtless all closely allied, but seem distinguishable by the following characters. *E. cognatum* differs from both the others by its subcoriaceous, yellowish-green and smaller leaves. *E. hamatum* and *E. Lugardae* have thin herbaceous or submembranous leaves, dark green above, paler beneath, but *E. hamatum* (according to Klotzsch's description) has leaves 1⅓ in. long and 6 lin. broad, and merely acute, with conduplicate obovate-bracts; whilst in *E. Lugardae* they are 1⅓–2⅔ in. long, 4–11 lin. broad, and long-acuminate, with flattish ovate bracts.

Verbenaceae.

Lippia nodiflora, *Rich.*

Near Kwebe, *Lugard*, 83; Botletle Valley, *Lugard*, 199.

Flowers purplish-white.

Lantana salvifolia, *Jacq.*

Kwebe Hills, 3,400 ft., *Lugard*, 176; *Mrs. Lugard*, 68.

A perennial, growing to 2 ft. high; flowers, some white some mauve on the same head.

Bouchea pinnatifida, *Schauer.*

Kwebe Hills, 3,000 ft., *Mrs. Lugard*, 166.

An annual, growing to 10 in. high.

Clerodendron spinescens, *Gürke.*

Okavango Valley, about 3,000 ft., *Lugard*, 234.

A thorny bush; flowers scarlet.

Clerodendron lanceolatum, *Gürke.*

Kwebe Hills, 3,400 ft., *Lugard*, 91 ; *Mrs. Lugard*, 98.

A perennial, 1½–2½ ft. high ; corolla snow-white ; stamens with red filaments and yellow anthers ; odour offensive when the plant is bruised.

Labiatae.

Ocimum Knyanum, *Vatke.*

Kwebe Hills, 3,300 ft., *Mrs. Lugard*, 67.

An erect perennial, growing to 18 in. high, strongly aromatic ; flowers mauve.

Ocimum tereticaule, *Poir.*

Kwebe Hills, 3,200 ft., *Lugard*, 96 ; *Mrs. Lugard*, 84.

Plant 1–2 ft. high, perennial, aromatic ; leaves sometimes variegated ; flowers purple.

Orthosiphon Schinzianus, *Briq.*

Kwebe Hills, 3,400 ft., *Lugard*, 140 ; *Mrs. Lugard*, 126.

An erect annual, 1½–2 ft. high, aromatic ; flowers purple ; terminal bracts white or pale purple to dark purple.

Acrotome inflata, *Benth.*

Kwebe Hills, 3,300 ft., *Mrs. Lugard*, 181, 187.

An erect annual, growing to a height of 5 ft. ; flowers very pale mauve.

Leonotis kwebensis, *N. E. Br.* *Folia* petiolata, ovata, dentata, utrinque velutina. *Calyx* apice curvatus, minute pubescens, 8-dentatus ; dentes laterales minores. *Corolla* aurantiaca ; tubus calyce aequilongus ; labium superius 9–10 mm. longum, angustum ; labium inferius 4 mm. longum, trilobum ; lobi oblongi, obtusi, laterales ciliati.

An erect *annual* growing to about 4 ft. in height. *Stems* deeply 4-sulcate with rounded angles in the dried state, covered with a minute dense pubescence, and with a ring of long hairs at each node. *Leaves* spreading, minutely velvety-pubescent on both sides ; petiole ¾–1½ in. long ; blade 2–4 in. long, ⅔–2¼ in. broad (or probably larger), ovate or the uppermost lanceolate, obtusely acute, cuneately acute at the base, evenly dentate. *Verticillasters* densely many-flowered. *Bracts* 2½–6 lin. long, ¼–¾ lin. broad, linear, pungent-mucronate, minutely pubescent. *Calyx* curved at the apex, 8-toothed, minutely pubescent outside and inside, and with some long hairs near the top of the tube outside ; tube 5–6 lin. long, 10-ribbed ; dorsal tooth 2½ lin. long, the two lateral teeth on each side 1 lin. long, and the three lower teeth 1½–1¾ lin. long, all spine-tipped. *Corolla* bright orange or orange-scarlet ; tube about equalling the calyx-tube or slightly exceeding it, 5–6 lin. long, slender, glabrous below and pubescent on the upper part outside, puberulous within in the upper part, and with three equidistant rings of short erect hairs below the middle, the lowest ring about 1 lin. above the base of the tube, the others at a distance of ¾ lin. from each other above it ; upper lip 4½–5 lin. long, narrow, about 1 lin. broad measured sideways, very slightly arched, acute, densely villose-tomentose with orange-scarlet hairs ; lower lip 2 lin. long, 3-lobed, ciliate on the lateral lobes, otherwise glabrous ; lobes

oblong, obtuse, the middle one 1–1½ lin. long, the lateral shorter. *Stamens* inserted at the base of the upper lip of the corolla, and the longer pair almost equalling it in length ; filaments broad and flat, cohering by means of the interwoven hairs with which they are ciliate. *Style* glabrous.

Kwebe Hills, 3,300 ft., *Mrs. Lugard*, 222.

This species is very similar to *L. pallida*, Benth, but is readily distinguished by the orange-scarlet (not pale yellow) colour of the corolla, which is much less gibbous on the back of the upper lip, and has the rings of hairs in its tube placed much nearer to the base than they are in *L. pallida*.

Nyctagineae.

Boerhaavia plumbaginea, *Car.*

By the Lake River, *Lugard*, 14 ; Kwebe Hills, 3,300 ft., *Mrs. Lugard*, 21.

A perennial, growing to a height of 4–6 ft. ; flowers white.

Boerhaavia adscendens, *Willd.*

Botletle Valley, *Lugard*, 198.

A swamp weed ; flowers purple. There are only young buds on the specimen, but it appears to be this species.

Boerhaavia pentandra, *Burch.*

Bechuanaland ; near Palapye, 3,000 ft., *Lugard*, 276.

Creeping on the ground ; flowers magenta.

Amarantaceae.

Hermbstaedtia scabra, *Schinz.*

Kwebe Hills, 3,300 ft., *Lugard*, 151 ; *Mrs. Lugard*, 196.

An annual, 2–4 ft. high ; flowers pink. This is evidently a dimorphic species, the staminal-tube is longer, and the ovary more attenuated in some specimens than in others ; they probably represent sexual forms.

Hermbstaedtia elegans, *Moq.* var.

Near Bachakuru in the Kalahari Desert, *Lugard*, 236.

Flowers purplish-white.

Sericocoma sericea, *Schinz.*

Kwebe Hills, 3,000 ft., *Lugard*, 181 ; *Mrs. Lugard*, 165.

Annual, growing to 2 ft. high ; flowers green or dirty-white, with the terminal part of the stamens chocolate-coloured.

Sericocoma Bainesii, *Hook. f.*

Kwebe Hills, 3,000 ft., *Mrs. Lugard*, 158.

A perennial, growing to about 18 in. high ; flowers greenish-white.

Sericocoma Welwitschii, *Baker.*

Kwebe Hills, 3,300 ft., *Lugard*, 170 ; *Mrs. Lugard*, 221.

Plant growing to 2½ ft. high ; flowers greenish-white, becoming cream-coloured. The two specimens quoted are very different in appearance, but I believe them to be the same species in different stages of development.

Pupalia lappacea, *Moq.*
Kwebe, *Lugard*, 175.
Flowers greenish-white.

Ærua javanica, *Juss.*
Kwebe, *Lugard*, 180.

Pandiaka deserti, *N. E. Br.* *Herbacea*, ramis albo-striatis. *Folia* opposita, lanceolata vel lineari-lanceolata, spinescenti-acuta, crispato-undulata. *Capitula* subglobosa, pluriflora. *Flores* 4 lin. longi. *Ovarium* compresso-globosum.

Herb, with opposite diverging striate branches, the striae filled with white wool. *Leaves* opposite, $\frac{2}{3}$–1 in. long, 1–3 lin. broad, lanceolate or linear-lanceolate, acute, tipped with a small spine, subsessile or narrowed into a short petiole at the base, crisped on the margins, at first covered with a minute white wool, becoming more or less glabrous. *Flowers* all hermaphrodite, in terminal subglobose heads, sessile between a pair of small leaves, pink or becoming pale ochreous in the dried state. *Bracts* solitary under each flower, $1\frac{3}{4}$–$2\frac{1}{2}$ lin. long, $\frac{3}{4}$–$1\frac{1}{4}$ lin. broad, ovate, acuminate into a stiff arista, chaffy or submembranous, thinly cottony or cobwebby. *Perianth* segments 5, slightly unequal, $3\frac{1}{2}$–4 lin. long, $\frac{2}{3}$–$\frac{7}{8}$ lin. broad at the base, thence gradually tapering to a very acute subpungent point, submembranous, with a thick rigid midrib, thinly cottony or cobwebby. *Stamens* 5, included, alternating and connate with 5 subquadrate or ovate-oblong irregularly 3-toothed membranous staminodia, forming a cup $\frac{3}{4}$ lin. long, the free part of the filaments 1–$1\frac{1}{2}$ lin. long; anthers $\frac{1}{3}$ lin. long, oblong. *Ovary* subglobose or obovoid, rounded or subtruncate at the top; style $1\frac{3}{4}$–2 lin. long, filiform, stigma simple, slightly thickened. *Ovule* solitary, pendulous from a long erect basal funicle.

Northern Kalahari Desert; near Chukutsa Salt-pan, *Lugard*, 221.

Phytolaccaceae.

Microtea tenuissima, *N. E. Br.* *Lophiocarpus tenuissimus*, Hook. f. Ic. Pl. xv., p. 50, t. 1,463, f. 10–11.

Okavango Valley, 3,000 ft., *Lugard*, 277. German South-West Africa: Amboland; Omupanda, *Wulfhorst*, 33; Oshando, *Schinz*, 900.

When Turczaninow established the genus *Lophiocarpus* he placed it in the order *Chenopodiaceae*, and it has been retained as a distinct genus in that order until the present time, its identity with the genus *Microtea* having been overlooked. Sir Joseph Hooker, however, when describing this species and *L. Burchellii*, Hook. f., in the *Icones Plantarum*, as cited above, expresses a doubt as to whether *Lophiocarpus* should not be transferred to *Phytolaccaceae*, and Volkens in *Engler & Prantl Pflanzenfam.*, iii., i., A, p. 90, without further investigation, reiterates the same opinion.

In structure and habit *Lophiocarpus* quite agrees with *Microtea*, whilst in general appearance the two species figured in the *Icones Plantarum* are similar to *Microtea tenuifolia*, but are more rigid.

With regard to the natural order to which the genus belongs, there is no doubt that its affinity is with *Rivina* and *Monococcus*, and it therefore is rightly placed in *Phytolaccaceae*.

As the name *Lophiocarpus* has to be abolished, the following is the synonymy of the two remaining species placed under that genus.

Microtea Burchellii, *N. E. Br.* *Lophiocarpus Burchellii*, Hook. f., in Benth & Hook. f. Gen. Pl. iii., p. 50, and Ic. Pl., xv., t. 1,463.

South Africa: Griqualand West; at Griqua Town, *Burchell*, 1934. Bechuanaland; Batlapin Territory (Vryburg District) *Holub*!

Microtea polystachya, *N. E. Br.* *Lophiocarpus polystachyus*, Turcz. in Bull. Soc. Nat. Mosc. xvi., p. 56. *Wallinia polystachya*, Moq. in DC. Prod. xiii., pt. 2, p. 143.

South Africa: Little Namaqualand; by the Orange River, near Verleptpram, *Drège*, 2940!

Polygonaceae.

Oxygonum alatum, *Burch.*

Kwebe Hills, 3,300 ft., *Lugard*, 89, 90; *Mrs. Lugard*, 109.

Flowers white.

Thymelaeaceae.

Arthrosolen polycephalus, *C. A. Mey.*

Botletle River Flats, 3,000 ft., *Mrs. Lugard*, 4.

Perennial plant, 2 ft. high; flowers yellow, with a very powerful scent.

Loranthaceae.

Loranthus namaquensis, *Harv.*

Bechuanaland; at Keria, growing upon *Pluchea Leubnitziae*, N. E. Br., *Lugard*, 1; Kwebe Hills, 3,000 ft., growing chiefly upon Acacia trees, *Mrs. Lugard*, 228.

Flowers scarlet; fruit red.

Loranthus Dregei, *Eckl. & Zeyh.* var.

Totin, near Lake Ngami, parasitic upon Acacia, *Lugard*, 30; Kwebe Hills, 3,300 ft., *Mrs. Lugard*, 44.

Flowers whitish-grey or greenish-cream; fruit bright red when ripe.

Loranthus Lugardi, *N. E. Br.* *Folia* parva, oblonga, obtusa, basi cuneata, brevissime petiolata, minute puberula. *Flores* axillares, fasciculati, sessiles. *Bractea* cupuliformis, truncata, ciliolata. *Calycis limbus* breviter tubulosus, truncatus, ciliolatus. *Corolla* anguste cylindrica, viridis, fere ad medium unilateraliter fissa, superne 5-loba; lobi anguste lineari-spathulati, obtusi, erecti. *Bacca* ellipsoidea, lutea, apice rubra.

Flowering branchlets 1–1⅓ lin. thick, greyish-brown, puberulous. *Leaves* alternate, 1–5 lin. apart, ½–1⅓ in. long, 1¾–4½ lin. broad, oblong or cuneate-oblong, obtuse, cuneately narrowed into a very short petiole at the base or subsessile, rather thick and rigidly coriaceous in the dried state, minutely puberulous. *Flowers* in

axillary clusters of 2–5, sessile. *Bract* 1 lin. long, cup-shaped, subtruncate, indistinctly crenate or slightly notched on one side, minutely ciliate, otherwise glabrous, light green. *Calyx* 1⅓–1½ lin. long, of which 1 lin. belongs to the tubular, truncate, minutely ciliate, light green limb. *Corolla* 1½ in. long, slender, cylindric, straight, about ¾ lin. in diam., slightly enlarged to about 1 lin. in diam. just below the obtuse apex; when in bud whitish below, light green in the upper part, with 5 purple-brown stripes inside the upper part of the tube; when open, it is split to about half-way down on one side, and divided above into 5 linear-spathulate, erect or reflexed lobes 5 lin. long, ½ lin. broad near the apex. *Stamens* abruptly inflexed, glabrous; filaments about ¼ in. long; anthers 1⅓–1½ lin. long, linear, basifixed, yellow. *Style* about as long as the corolla, filiform, glabrous; stigma sub-globose. *Berries* about ⅓ in. long, ellipsoid, yellow for ¾ of their length, red at the apex, crowned with the persistent calyx-limb.

Kwebe Hills, 3,000–3,500 ft., *Mrs. Lugard*, 20; Totin, near Lake Ngami, *Lugard*, 32.

This species is allied to *L. oleaefolius*, Ch. & Sch., but differs in having rather smaller leaves and sessile flowers. According to Mrs. Lugard, it grows chiefly upon Acacia trees.

Loranthus splendens, *N. E. Br.* Omnino glaber. *Folia* coriacea, oblonga, obtusissima, basi cuneata. *Cymae* multiflorae. *Bracteae* obliquae, ovatae, acutae, dorso gibbosae. *Ovarium* 5–6 mm. longum, obconicum. *Calycis limbus* 1 mm. longus, truncatus. *Corolla* curvata, basi oblique gibbosa, infra mediam fissa; petala 5 cm. longa, linearia, acuta, basi intus plicata, ad media voluta. *Stamina* procurva; antherae lineares, basifixae.

Quite glabrous in all parts, apparently overspread with a glaucous bloom on the purplish-grey branches, foliage, and green parts of the cymes. *Leaves* alternate, petiolate, rigidly coriaceous; petiole 2 lin. long; blade 1½–2½ in. long, 5–10 lin. broad, oblong, very obtuse, shortly cuneate at the base, 3–5-nerved. *Cymes* apparently produced on the leafless parts of the branches, 2–25-flowered. *Peduncles* 0–4 lin. long. *Pedicels* 4–5½ lin. long. *Bracts* oblique, very shortly cupular at the base, produced on one side into an ovate acute limb ¾ lin. long, gibbous on the back. *Ovary* 2½–3 lin. long, obconic, about 2 lin. in diam. at the top. *Calyx-limb* ½ lin. long, cupular or annular, truncate. *Corolla* when in mature bud about 2 in. long (following the curve), very oblique and curved at the base, which is gibbous in front and at that part about ¼ in. in diam., the middle part is cylindric, nearly straight and about 1 lin. in diam., the upper part is very much curved forward, clavate, obtuse and about 1¾ lin. in diam.; when expanded, the corolla is obliquely divided to about 5 lin. above the base into 5 linear acute channelled petals, which are rather broader in the upper part than at the middle, where they spirally coil themselves up and intermingle. In the basal part they are so slightly connate as to become quite free in the process of drying, and have several oblique folds or ridges within; in the living state the corolla is of a brilliant carmine, fading into orange towards the tips of the petals, but when dried the whole corolla is of an ochreous tint. *Stamens* equalling the corolla, their free part 1¾ in. long, curved forwards, brilliant

carmine, glabrous, anthers linear, basifixed. *Style* 2 in. long or rather more, brilliant carmine, glabrous, stigma capitate.

Okavango Valley, 3,000 ft., parasitic upon *Acacia horrida*, *Lugard*, 232.

This brilliantly coloured species is closely allied to *L. curviflorus*, Benth. (which ranges from Arabia, through Nubia, and down the eastern side of Africa, to the northern part of German East Africa), and is evidently the western representative of that species. It differs from *L. curviflorus* in its much broader leaves, much larger and stouter flowers, and especially in the ovary which is at least twice as long as that of *L. curviflorus*, and much stouter.

Santalaceae.

Thesium dissitum, *N. E. Br.* *Herba* nana, erecta, 12–15 cm. alta, omnino glabra, ramosa. *Rami* brevi, erecti, cauli subparalleli. *Folia* 9–23 mm. longa, anguste linearia, acuta, dorso carinata incurvo-erecta, glabra. *Paniculus* vel pseudo-racemus parvus, 1·5–2·5 cm. longus, ramulis 1–4 mm. longis, apice 1–3-floris. *Flores* sessiles, 3-bracteati. *Bracteae* inaequales, 1·5–10 mm. longi. *Perianthium* 3 mm. longum, lobis 1·5 mm. longis, lanceolatis, acutis, apice intra pilis paucis crispulis ornatis. *Fructus* ignotus.

Bechuanaland; Kalahari Desert, near Mamunwe, *Lugard*, 239.

This is not very similar in appearance to any other Tropical or South African species. The flowers, according to Lugard, are brownish-yellow.

Euphorbiaceae.

Euphorbia kwebensis, *N. E. Br.* *Annua*, ramosa, glabra. *Folia* linearia vel anguste lineari-oblonga, apice minute tridenticulata. *Involucra* solitaria in furcis supremis ramorum, breviter pedunculata, campanulata. *Glandulae* integrae, transverse oblongae, supra transversim carinatae. *Bracteolae* filiformes. *Styli* bifidi. *Semina* carunculata, oblonga, compressa, rugosa, dealbata.

An annual *herb*, 6–15 in. high, somewhat corymbosely branched, glabrous on all parts except inside the involucre under the glands, and sometimes on the ovary and capsule. *Leaves* mostly opposite, but with 3 in a whorl at the top of the main stem where it branches into 3, and occasionally there are 1 or more alternate on the same plant, spreading; petiole 1–3 lin. long; blade 1–2 in. long, $1\frac{1}{3}$–$3\frac{1}{2}$ lin. broad, linear or narrowly linear-oblong, obtuse and minutely 3-toothed at the apex, cuneate at the base. *Stipular line* bearing 2–3 minute subulate processes (glands ?). *Involucre* solitary in the forks of the branches or terminal, shortly pedicellate, campanulate, $\frac{3}{4}$ lin. long, about 1 lin. in diam., divided at the top into 4 short oblong fimbriate lobes, alternating with 4 transversely oblong entire glands $\frac{1}{2}$ lin. broad, marked with a transverse ridge on their face, pubescent beneath on the inner side. *Pedicel* $\frac{1}{2}$–$\frac{3}{4}$ lin. long. *Bracteoles* between the stamens filiform, entire. *Ovary* and *capsule* glabrous or thinly covered with very short stout hair-like processes; styles bifid, glabrous, red. *Seeds* $1\frac{1}{4}$–$1\frac{1}{3}$ lin. long, carunculate, oblong, flattened, very rugose, white or faintly bluish-white; caruncle pale yellowish.

Kwebe Hills, 3,300 ft., *Lugard*, 143 ; *Mrs. Lugard*, 81.

A very distinct species, unlike any other from Tropical Africa that I have seen ; it is, perhaps, nearest allied to *E. dracunculoides*, Lam., but the 3-toothed leaves and very different glands of the involucre readily distinguish it. In general appearance it may be likened to *E. macra*, Hiern, from which it abundantly differs in its annual habit and broader 3-toothed leaves.

Euphorbia crotonoides, *Boiss.* in DC. Prodr. xv., pt. 2, p. 98.

This would appear to be a rare plant. It was originally discovered in 1837, near El Obeid, in Cordofan, by Kotschy, and the species was founded upon his specimens ; no other collector, so far as I am aware, has again found the plant until Captain and Mrs. Lugard sent it to Kew from Ngamiland, a region more than 2,000 miles south of the locality where it was originally discovered. Yet annuals are frequently widely distributed, and it may have been overlooked by other collectors, but as it grows 1–1½ ft. in height, with very spreading branches and large leaves, it ought to be sufficiently conspicuous wherever it is present. However, its discovery in Ngamiland is an interesting one, and widely extends its range. Specifically, it is nearly allied to *E. systyla*, Edgew., differing in its angular stem, serrate leaves (which are remarkably winged along the midrib beneath), and in the villous fruit.

Kwebe Hills, 3,300 ft. alt., *Lugard*, 160 ; *Mrs. Lugard*, 183.

Euphorbia Monteiri, *Hook. f.*

Tontin, near Lake Ngami, *Lugard*, 75 ; Kwebe Hills, 3,300 ft., *Lugard*, 247 ; *Mrs. Lugard*, 87.

An erect succulent perennial, with a stem up to about 1 ft. high, then branching out annually into fresh green stalks bearing foliage and flowers ; flowers maroon-coloured ; fruit green.

Monadenium Lugardae, *N. E. Br.* *Frutex* carnosus, ramosus ; rami teretes, crassi, subtuberculati. *Folia* 1·3–3·8 cm. longa, obovata, subacuta, minutissime crenulata, puberula. *Cymae* ad apicem ramorum confertae, simpliciter trichotomae. *Involucra* brevissime pedicellata, bracteis vix longiora, subcampanulata, truncata, uno latere ad medium fissa, intra 5 lobis subrectangularibus fimbriatis membranaceis instructa. *Ovarium* pedicillatum, reflexum, acute trigonum, angulis biseriatim crispatulo-cristatis.

A branched *succulent plant* about 2 ft. high. *Branches* ¾–1 in. thick, cylindric, covered with large rhombic very slightly projecting tubercles 4–6 lin. long, 4–5 lin. broad, glabrous. *Leaves* appearing before the flowers, tufted at the tips of the branches, ⅔–1½ in. long, 3–7 lin. broad, obovate, obtuse or subacute, tapering below into a short broad petiole, minutely and irregularly crispate-crenulate, minutely pubescent all over. *Cymes* clustered at the tips of the branches, simply trichotomous ; primary peduncles 1½–3 lin. long ; secondary peduncles or branches of the cyme ¾–1 lin. long. *Bracts* 2–3½ lin. long, 3–4 lin. broad, amplexicaul, embracing the involucre and about as long as it, shortly and obtusely bifid at the apex, minutely puberulous. *Involucre* about 1½ lin. long, subcampanulate, truncate, entire, open down one side, glabrous, light green, with an orange-brown margin, furnished within with five membranous, white, broadly oblong, concave, fimbriate lobes, which

subtend the five clusters of stamens or male flowers. *Ovary* and *capsule* pedicellate, somewhat acutely 3-angled and with two narrow minutely crispate-denticulate russet-coloured wings along each angle, minutely puberulous. *Seeds* about 1¾ lin. long, carunculate, oblong, 4-angled, white, minutely and rather obscurely tuberculate; caruncle ochreous-yellow.

Kwebe Hills, 3,500 ft., rare, only one bed of it, consisting of a large number of plants, found at the foot of Kwebe Peak, *Mrs. Lugard*, 22.

According to a note on Mrs. Lugard's drawing of this plant, the leaves are developed from February to May, and the flowers in August.

Phyllanthus Niruri, *Linn.*

Kwebe Hills, 3,500 ft., *Mrs. Lugard*, 80; *Lugard*, 155.

Jatropha humilis, *N. E. Br.* *Herba* pubescens. *Rami* decumbentes vel patentissimi. *Folia* petiolata, oblonga vel oblongo-lanceolata, acuta, basi obtusa vel rotundata. *Cymae* terminales, multiflorae. *Calyx* infra medium 5-lobus; lobi oblongi, acuti. *Petala* oblanceolata vel spathulata-oblanceolata, obtusa, glabra. *Discus* 5-partitus.

A dwarf perennial *herb*, probably tuberous. *Underground stem* brown, glabrous, bearing a few minute deltoid scales, branching at the surface into 2–6 or more decumbent or widely spreading simple leafy branches 2–3½ in. long, softly pubescent with short spreading hairs. *Leaves* alternate, exstipulate; petiole 1½–5 lin. long, pubescent; blade 1–2¾ in. long, ½–1¼ in. broad, all oblong or oblong-lanceolate, acute, obtusely rounded at the base, or one or more of the lower leaves lobed on one or on both sides, thinly pubescent on both sides with short spreading hairs. *Inflorescence* cymose, pubescent, many-flowered, terminal at the centre of the plant, leafless, the leafy branches not producing flowers. *Male flowers* numerous, somewhat crowded. *Female flowers* few, solitary at the base of the main divisions of the inflorescence. *Bracts* ⅔–1¾ lin. long, lanceolate or subulate, acute, toothed or entire at the base. *Pedicels* ⅓–1½ lin. long. *Calyx* of the male flowers 1–1¼ lin. long, of the female flowers 1½–1⅔ lin. long, 5-lobed to below the middle, glabrous or pubescent, lobes erect, oblong, obtuse or subacute. *Petals* of the male flowers 2¾ lin. long, ⅔ lin. broad; of the female flowers 2¾–3½ lin. long, ⅔ lin. broad, oblanceolate or spathulate-oblanceolate, obtuse, yellow or purple, glabrous. *Stamens* 5–6, free, shorter than the petals, absent in the female flowers. *Disk* of five very obtuse or subtruncate lobes. *Ovary* about as long as the calyx, pubescent; styles 3, bifid, 1¼–1½ lin. long, glabrous or slightly pubescent at the base. *Capsule* subglobose, 6–7 lin. in diam., pubescent.

Kwebe, *Lugard* 56, 159.

A very distinct species belonging to the same group as *J. Zeyheri*, Sond., and *J. natalensis*, Müll.-Arg.

Croton zambesicus, *Müll.-Arg.*

Kwebe, *Lugard*, 246.

Croton amabilis, *Müll.-Arg.*

Kwebe Hills, 3,400 ft., *Lugard*, 33 ; *Mrs. Lugard*, 35.

According to Mrs. Lugard's note it is "a bushy tree up to 15 ft. high ; remains in bud all the dry season, looking quite dead and dried up, with the first rains it suddenly bursts into full flower ; flowers yellow." According to Lugard :—"A shrub 3–4 ft. high, flowers at the end of November ; flowers yellowish-green, sweet scented."

Croton megalobotrys, *Müll.-Arg.*

Lake River, *Lugard*, 17.

A tree, attaining 30 ft. in height ; flowers green.

Croton kwebensis, *N. E. Br.* *Frutex* ramosus ; ramuli graciles, dense tomentosi. *Folia* petiolata, oblonga, elongato-ovata vel elliptico-oblonga, supra viridia, tenuiter stellato-pubescentia, subtus dense argenteo-lepidota. *Racemi* terminales, subfulvescenti-lepidoti. *Flores* pedicellati ; *masculi* plures, superiores ; calyx profunde 5-lobus, lobis ovatis incurvato-patentibus intus glabris ; petala anguste oblanceolata, hirta, recurva ; stamina 15 : *feminei* inferiores, pauci vel nulli ; calyx infra medium 5-lobus, lobi oblongi, subacuti vel obtusi, intra pubescentes ; petala et stamina nulla ; ovarium lepidotum ; styli 3–4, profunde bifidi, glabri.

A woody *shrub*, 3–6 ft. high, much branched. *Branchlets* slender, densely tomentose with stellate hairs, which arise from the centre of orbicular scales, pale fulvous ; at length becoming glabrous, with a grey bark. *Leaves* shortly petiolate ; petiole ¾–1 lin. long, tomentose like the branchlets ; blade ½–2¼ in. long, ¼–1 in. broad, oblong, elliptic-oblong, elongate-ovate or oblong-ovate, green and thinly covered with simple, forked and stellate hairs on the upper surface, densely covered with silvery orbicular scales beneath. *Racemes* terminal, ¾–2½ in. long, 5–15-flowered, everywhere covered with orbicular scales and stellate hairs intermingled, of a pale fulvous colour. *Flowers* all male, or 1–3 at the base of the raceme female. *Bracts* minute, ⅓–½ in. long. *Male flowers :* pedicels 2–3½ lin. long ; calyx 5-lobed almost to the base ; lobes 1 lin. long, ⅔ lin. broad, ovate, subacute, spreading-incurved, glabrous within ; petals 1¼–1⅓ lin. long, ⅓ lin. broad, narrowly oblanceolate, obtuse or acute, shortly hairy on the inner surface and ciliate, spreading and recurved between the sepals ; stamens 15, some of them often with abortive anthers ; filaments slightly hairy ; disk pilose. *Female flowers :* pedicels 1–1½ lin. long ; calyx 5-lobed to two-thirds of the way down ; lobes ¾ lin. long, about ⅔ lin. broad, oblong, subacute or obtuse, incurved at the tips, pubescent within ; petals and stamens none ; ovary densely covered with light fulvous orbicular scales ; styles 3–4, deeply bifid, glabrous, dull purple.

Kwebe Hills, 3,300 ft., *Lugard*, 34 ; *Mrs. Lugard*, 41.

Cephalocroton mollis, *Kl.* var. **pilosa**, *Schinz.*

Kwebe Hills, 3,000 ft., *Mrs. Lugard*, 70.

A shrub, up to 4 ft. high ; perianth green, stamens and stigmas yellow according to Mrs. Lugard's drawing.

Claoxylon virens, *N. E. Br.* *Frutex* omnino molliter pubescens. *Folia* breviter petiolata, ovata vel lanceolata, obtuse acuta, subintegra vel paucidentata. *Racemi* masculi pedunculati, compacto-

densiflori. *Pedicelli* filiformes. *Sepala* 4–5, valvata, lanceolata, acuta, recurva. *Stamina* circa rudimentum ovarii inserta, 2–5 perfecta, 5–10 staminodiis clavatis circumdata. *Flores feminei* ignoti.

A much branched *shrub*, 3–4 ft. high, with a pale grey bark; young shoots, both sides of the leaves, peduncles, pedicels and outside of the calyx all softly pubescent with short spreading hairs. *Leaves* alternate, herbaceous, green on both sides; petiole 1–1½ lin. long; blade ½–2 in. long, 3–11 lin. broad, lanceolate to ovate, tapering to a somewhat obtuse point, rounded at the base, subentire or with one or a few teeth on each margin, chiefly on the basal half. *Racemes* pedunculate, axillary, ⅓–1⅙ in. long, bearing 2–5 crowded clusters of very small green flowers at the apical part. *Pedicels* 1–2 lin. long, hair-like. *Sepals* 4–5, valvate in bud, ½–⅔ lin. long, ⅕–⅙ lin. broad, lanceolate or linear-lanceolate, acute, very spreading, recurved at the tips. *Staminodia* 5–10, clavate, without anthers, surrounding the stamens. *Perfect stamens* 2–5, surrounding a rudimentary ovary; filaments about ⅛ lin. long, glabrous; anther-cells nearly as long as the filaments, free to the base, somewhat divergent, opening by longitudinal slits. *Female flowers* not seen.

Kwebe Hills, 3,400 ft., *Lugard*, 53, 94; *Mrs. Lugard*, 51.

Acalypha ciliata, *Forsk.*

Kwebe Hills, 3,300 ft., *Mrs. Lugard*, 184A; *Lugard*, 154.

An erect annual, to 15 in. high; flowers green; anthers yellow.

Acalypha indica, *L.*

Kwebe Hills, 3,300 ft., *Mrs. Lugard*, 184, and 137—a small variety.

An annual, to 12 in. high; flowers green, and red and green.

Ricinus communis, *L.*

By the Botletle River at Sebituane's Drift, and also on the Kwebe Hills, 3,000–3,300 ft., *Mrs. Lugard*, 1.

Found close to water, grows to 7 ft. high.

Tragia cordifolia, *Benth.*

Kwebe Hills, 3,300 ft., *Lugard*, 66; *Mrs. Lugard*, 61.

Hydrocharidaceae.

***Boottia muricata**, *Wright* in Fl. Trop. Afr. vii., p. 569.

Botletle River, *Lugard*, 13; Okavango River, 3,000 ft., *Lugard*, 279.

Petals white; stamens yellow.

Orchidaceae.

Lissochilus Wakefieldii, *Reichb. f.*

Botletle Valley, 3,000 ft., *Lugard*, 281.

Flowers yellow.

***Habenaria Lugardii**, *Rolfe* in Fl. Trop. Afr. vii., p. 228.

Botletle Valley, *Lugard*, 215.

Flowers white.

Haemodoraceae.

Sansevieria, species doubtful, portion of a leaf and inflorescence only.

Banks of the Botletle River, 3,000 ft., *Mrs. Lugard*, 9.

Flowers green.

Iridaceae.

***Ferraria bechuanica**, *Baker* in Fl. Trop. Afr. vii., p. 344.

Near Kwebe Hills, *Lugard*, 282 ; Kalahari Desert ; near Mamunwe, *Lugard*, 237.

Petals chocolate.

Lapeyrousia Bainesii, *Baker*.

Kwebe, *Lugard*, 179 ; near Bachakuru, *Lugard*, 242.

Flowers white, with a chocolate spot at the base of the lower segments, strongly scented.

***Lapeyrousia porphyrosiphon**, *Baker* in Fl. Trop. Afr. vii., p. 353.

Kalahari Desert ; near Mamunwe, *Lugard*, 238.

Flowers pure white, with a purple-tinted tube.

Amaryllidaceae.

***Crinum Lugardae**, *N. E. Br.* in Gard. Chron. 1903, xxxiv., p. 49.

Kwebe Hills, 3,300 ft., *Mrs. Lugard*, 43.

Flowers 2–6 together, white, with a pink medium stripe down each segment.

Crinum crassicaule, *Baker*, Amaryll. p. 85. *Bulb* globose, "24 inches in circumference," without a distinct neck. *Leaves* 8–10 to a bulb, "5 inches broad," ciliate, at least on the basal part, their length and outline undeterminable, as (according to the drawings) the upper part has decayed and become torn off when the plant is in flower. *Scapes* 1–2 to a bulb, arising at the side of the rosette of leaves, about 4–6 in. long and 1–1¼ in. across their greatest diameter, compressed, 8–12-flowered. Outer *bracts* about 3½ in. long and 1 in. or more broad, lanceolate, acute, reflexed ; inner bracts 1–1½ in. long, linear to linear-filiform. *Pedicels* 1–8 lin. long. *Ovary* ellipsoid, about ¾ in. long. *Perianth-tube* 3½–4½ in. long, slightly curved or straight, cylindric, greenish ; limb funnel-shaped, white, with a rosy stripe down the middle of the segments, which are 4–4¾ in. long, ⅞–1 in. broad, lanceolate, acute, suberect, recurved-spreading at the tips. *Stamens* 2½–3 in. long ; filaments white, anthers yellowish. *Style* exserted about 1 in. beyond the stamens, pink ; stigma minutely 3-lobed.

Ngamiland : Koobie (Kobis), *Baines* ; Kwebe Hills, 3,500 ft., *Mrs. Lugard*, 45.

As this species was originally described from incomplete material and has been omitted from the Flora of Tropical Africa, I have given the above amended description, compiled from the very careful drawings of Mrs. Lugard and Mr. Baines and their notes and specimens, which latter are unfortunately without leaves.

***Crinum rhodanthum**, *Baker* in Fl. Trop. Afr. vii., p. 397.
Kwebe Hills, 3,300 ft., *Lugard*, 40 ; *Mrs. Lugard*, 42.
Leaves large, spreading close to the ground ; flowers pink to carmine.

Crinum sp. ; flowers only.
Okavango Valley, in inundated places, about 3,000 ft., *Lugard*, 284.

Pancratium Chapmanni, *Harv.*
Kwebe Hills, 3,300-3,400 ft., *Mrs. Lugard*, 36 ; *Lugard*, 39 ; near Lake Ngami, *McCabe*, 35.
Leaves very twisted ; flowers white, opening towards evening.
This is quite distinct from *P. trianthum*, Herb., with which it has been united in the Flora of Tropical Africa.

Liliaceae.

***Asparagus conglomeratus**, *Baker* in Fl. Trop. Afr. vii., p. 428.
Kwebe, *Lugard*, 52.
Flowers white.

***Asparagus bechuanicus**, *Baker* in Fl. Trop. Afr. vii., p. 429.
Nakalechwe, *Lugard*, 25.

***Asparagus Lugardi**, *Baker* in Fl. Trop. Afr. vii., p. 431.
Near Lake Ngami, *Lugard*, 31.
Flowers dull white.

Asparagus asiaticus, *L.*
Kwebe Hills, 3,300 ft., *Mrs. Lugard*, 40.
Flowers white.

Asparagus racemosus, *Willd.*
Nakalechwe, *Lugard*, 25A.

***Aloe Lugardiana**, *Baker* in Kew Bull. 1901, p. 135.
By the Botletle River at Sebituane's Drift, 3,000 ft., *Mrs. Lugard*, 2.
Leaves up to 1 ft. long and $1\frac{3}{4}$ in. broad, spotted with whitish ; flower-stem up to 3 ft. high ; flowers red.

***Eriospermum bechuanicum**, *Baker* in Fl. Trop. Afr. vii., p. 472.
Near Kwebe, *Lugard*, 80.
Flowers greyish-white.

***Eriospermum sphaerophyllum**, *Baker* in Fl. Trop. Afr. vii., p. 472.
Kwebe Hills, 3,000 ft., *Lugard*, 78, 285.
Flowers whitish-green.

***Anthericum flavoviride**, *Baker* in Fl. Trop. Afr. vii., p. 490.
Botletle Valley, *Lugard*, 194 ; Okavango Valley, about 3,000 ft., *Lugard*, 286.
Erect, 18 in. high, growing in sand ; flowers bright yellow.

Anthericum laxum, *N. E. Br.* *Folia* 45–50 cm. vel ultra longa, 2 mm. crassa, teretia, glabra. *Scapus* 60–70 cm. altus, superne laxe paniculato-ramosus, glaber, laevis, nudus. *Bracteae* membranaceae, 2 mm. longae, late ovatae, mucronatae. *Flores* distantes,

racemosi, erecti. *Pedicelli* 3–8 mm. longi, apice articulati. *Perianthium* 7 mm. longum, albidum. *Filamenta* staminum deflexo-scabrido-pubescentia.

Leaves 1½–1⅔ ft. or more long, about 1 lin. thick, terete, smooth, glabrous. *Flower-stem* 2–2½ ft. high, laxly paniculately branched above the middle, with spreading branches 4¾–6¾ in. long, smooth, glabrous, leafless. *Bracts* membranous, about 1 lin. long, broadly ovate, mucronate. *Flowers* racemose, solitary, rather distant. *Pedicels* suberect, 1½–4 lin. long, jointed at the apex, smooth, glabrous. *Perianth* about 3½ lin. long, "dirty white" (*Lugard*), with oblong, obtuse segments. *Stamens* shorter than the perianth, with the filaments densely scabrid-pubescent with short deflexed hairs.

Kalahari Desert; near Bachakuru, *Lugard*, 234.

This species is closely allied to and much resembles *A. pallidiflavum*, Engl. & Gilg, but has much stouter leaves, very much shorter, erect (not spreading) pedicels, and smaller flowers.

***Dipcadi platyphyllum**, *Baker* in Fl. Trop. Afr. vii., p. 518.
Kwebe, *Lugard*, 44.
Flowers green.

***Dipcadi firmifolium**, *Baker* in Fl. Trop. Afr. vii., p. 519.
Kwebe Hills, 3,300 ft., *Lugard*, 57; *Mrs. Lugard*, 64.
Flowers green.

***Dipcadi magnum**, *Baker* in Fl. Trop. Afr. vii. p. 522.
Kwebe Hills, 3,400 ft., *Lugard*, 88; *Mrs. Lugard*, 76.
Flowers dull green.

***Dipcadi vaginatum**, *Baker* in Fl. Trop. Afr. vii. p. 523.
Kwebe Hills, 3,200 ft., *Lugard*, 47; *Mrs. Lugard*, 56.
Each bulb with a single leaf; flowers green.

***Dipcadi brevipes**, *Baker* in Kew Bull. 1901, p. 136.
Kwebe Hills, 3,300 ft., *Mrs. Lugard*, 65.
Flowers green.

Albuca Bainesii, *Baker*.—*A. Lugardi*, Baker in Fl. Trop. Afr. vii. 533.

Kobis to North Shaw Valley, *Baines*. Kwebe Hills, 3,200 ft., *Mrs. Lugard*, 182; Botletle Valley, *Lugard*, 216.

I am quite unable to find any distinction whatever between *A. Bainesii* and *A. Lugardi*. The type of *A. Bainesii* consists of one leaf and two bits of inflorescence, the latter is identical with the inflorescence of *A. Lugardi*; the leaf is quite glabrous, whilst the leaves of Capt. and Mrs. Lugard's specimens represent various stages from completely glabrous to thinly pilose with long spreading hairs on the back. To the descriptions already published may be added the following particulars:—*Leaves* 2½–3 ft. long, ⅓–1¼ in. broad, deeply concave-channelled down the face, glabrous or with few or many spreading hairs on the back, and sometimes ciliate. *Flower-stem* 3–5 ft. high. Lower *bracts* 1–4½ in. long, and always much longer than the pedicels, not equalling them as originally described. Lower *pedicels* ½–1 in. long. The *flowers*, according to Mrs. Lugard's drawing, are greenish-yellow, with a broad stripe of darker green down the back of each segment.

Scilla lanceaefolia, *Baker*.
Kwebe Hills, 3,200–3,600 ft., *Mrs. Lugard*, 47.

***Iphigenia bechuanica**, *Baker* in. Fl. Trop. Afr. vii., p. 562.
Near Kwebe, *Lugard*, 81 ; Kwebe Hills, *Lugard*, 288.

***Iphigenia strumosa**, *Baker* in Fl. Trop. Afr. vii., p. 562.
Kwebe Hills, 3,200 ft., *Lugard*, 59 ; *Mrs. Lugard*, 57.
Flowers green and russet.

Gloriosa virescens, *Lindl.*
Botletle Valley, *Lugard*, 287.

Gloriosa Carsoni, *Baker*.
Botletle Valley, *Lugard*, 213.
Flowers bright yellow with red stripes.

Walleria muricata, *N. E. Br.* *Folia* conferta, 7–12 cm. longa, lineari-lanceolata, attenuata, acutissima, costa subtus spinis parvis uncinatis armata. *Pedunculi* axillares apice bracteati, muricato-scabri. *Perianthium* nutans, segmentis 13 mm. longis.

Plant about 6–8 in. high above ground-level, with the bulb 8–8¾ in. deep in the ground. *Leaves* crowded, erect, the 3–4 lowest small, ovate or ovate-lanceolate, the remainder 2¾–4¾ in. long, 2–3½ lin. broad, attenuate-linear-lanceolate, very acute, glabrous, armed with very small hooked prickles along the midrib beneath. *Peduncles* axillary, solitary, ascending, recurved at the apex just above the bract, scabrous with minute straight prickles. *Bracts* 4½–9 lin. long, ¾–1½ lin. broad, linear-lanceolate, acute. *Perianth* drooping, with linear-lanceolate acute segments about ½ in. long. *Anthers* collected into a cone, with exceedingly short filaments. *Fruit* globose, drooping.

Bechuanaland ; near Palapye, 3,000 ft., *Lugard*, 289.

This species seems to be nearest allied to *W. nutans*, Kirk, from which the more crowded leaves, armed with small prickles on the midrib beneath and the scabrous-muricate peduncles readily distinguish it. Lugard states that the natives eat the small round bulbs raw.

Commelinaceae.

Commelina benghalensis, *L.*
Kwebe Hills, 3,300 ft., *Lugard*, 243 ; *Mrs. Lugard*, 148.
An erect annual, growing to 18 in. high ; flowers blue.

Commelina Forskalaei, *Vahl.*
Kwebe Hills, 3,300 ft., *Lugard*, 136 ; *Mrs. Lugard*, 147.
Stems creeping, rooting at the nodes ; flowers blue.

Commelina imberbis, *Hassk.* ?
Kwebe Hills, 3,300 ft., *Lugard*, 244 ; *Mrs. Lugard*, 146.
Annual, at first spreading, then erect, up to 3 ft. high ; flowers blue.

Alismaceae.

Limnophyton obtusifolium, *Miq.*
Botletle Valley, *Lugard*, 206.
Flowers green.

Cyperaceae.

Kyllinga alba, *Nees.*
Kwebe Hills, 3,300 ft., in dry places amongst rocks, *Lugard*, 67 ; *Mrs. Lugard*, 139.

Cyperus compactus, *Lam.*
Kwebe Hills, 3,300 ft., in dry rocky places, uncommon, *Mrs. Lugard*, 143.

Cyperus fulgens, *Clarke.*
Kwebe Hills, 3,300–3,500 ft., common throughout these hills, not growing in swampy places, *Mrs. Lugard*, 104.
A bulbous species, growing to 18 in. high.

Cyperus articulatus, *Linn.*
Lake River, *Lugard*, 12.

Cyperus Haspan, *Linn.?*
Lake River, *Lugard*, 10.

Mariscus Sieberianus, *Nees.*
Kwebe Hills, 3,300 ft., growing in dry places amongst rocks, uncommon, *Mrs. Lugard*, 142.

Fimbristylis exilis, *R. & S.*
Kwebe Hills, 3,300 ft., very common in dry sandy wastes, *Mrs. Lugard*, 144 ; *Lugard*, 164.

Scirpus corymbosus, *Roth.*
Lake River, *Lugard*, 11.

Gramineae.

Tricholaena rosea, *Nees.*
Kwebe, *Lugard*, 162.

Panicum trichopus, *Hochst.*
Kwebe, *Lugard*, 163.

Eleusine aegyptiaca, *Pers.*
Botletle Valley, *Lugard*, 202.

Diplachne paucinervis, *Hack.*
Botletle plains, near Macharachara, *Lugard*, 218.

Eragrostis pilosa, *Beauv.*
Kwebe, *Lugard*, 165.

Eragrostis superba, *Peyr.*
Kwebe, *Lugard*, 178.

Filices.

Actinopteris radiata, *Link.*
Kwebe Hills, 3,300 ft., *Mrs. Lugard*, 226.
Grows to 5 in. high, amongst rocks in dry places, luxuriant from December to March, and found later after showers.

Pellaea Calamelanos, *Link.*
Kwebe Hills, 3,300 ft., *Mrs. Lugard*, 225 ; *Lugard*, 167.
Grows to 10 in. high, amongst rocks in dry parts, luxuriant from December to March, and found later.

XV.—A FUNTUMIA DISEASE.

(*Nectria funtumiae*, Massee.)

G. Massee.

A "canker" disease affecting *Funtumia elastica*, Stapf, was first brought to the notice of Kew in January, 1908. Mr. M. T. Dawe, F.L.S., Superintendent of the Scientific and Forestry Department, Entebbe, Uganda, submitted specimens in spirit of this "canker" for examination, together with a photograph taken by Dr. Christy. From the material it was not possible to arrive at an exact determination of the disease, but it appeared to be of the nature of "Slime Flux." Further material, in spirit, of cankered *Funtumia* was received in August, 1908, which appeared to represent an incipient stage of the disease, but it was not possible to do more than refer the disease to some form of "Slime Flux." Towards the end of the year Dr. Christy brought adequate material of the diseased *Funtumia* to Kew; this has enabled the fungus causing the disease to be determined.

The trunk is the part attacked, usually at a point four to six feet above the ground, never higher up where the trunk reaches above surrounding undergrowth and the air is drier. The first obvious indication of the disease is the appearance of a small black patch in the bark, which gradually extends until it may cover an area of a square foot or more. In some cases it is confined to one side of the trunk and in others the trunk may be completely girdled by the diseased area. As the disease progresses the bark increases very much in thickness, and becomes much cracked and rugged, presenting the appearance of large wounds caused by the disease known as "Slime Flux." A species of *Nectria* has been found to be the primary cause of injury. A few perithecia were observed on some of the dry material collected by Dr. Christy; this was soaked in water for three days, and afterwards kept at a temperature averaging 75° F. At the expiration of five days both forms of fungus fruit appeared on the bark and wood on the diseased area. The conidial form appears in the form of minute snow-white tufts, bearing the usual *Fusarium* type of conidia, measuring 40–45 × 3·5–4 μ. This is followed by the *Nectria* or ascigerous condition. The fungus proves to be new, and may be described as follows :—

Nectria funtumiae, Massee. *Coespituli* erumpentes minuti, 3–6 peritheciigeri, sparsi. *Perithecia* globoso-depressa, glabra, levia, coccinea, 350–400 μ diametro, ostiolo crasse obtuseque papillato brunneo instructa. *Asci* cylindracei, apice obtusi, rotundati, octospori. *Sporidia* oblique monosticha, elliptica, hyalina, 1-septata, 14–15 × 6 μ.

In truncis vivis *Funtumiae elasticae*.

Allied to *Nectria ditissima*, Tul., the well-known canker-forming parasite on various kinds of trees. *N. funtumiae* differs in the much larger perithecia and in the more prominent ostiolum; also in the perithecia being grouped in small scattered tufts.

The general appearance and mode of extension of the diseased patches agree closely with the cocoa-tree canker disease of Ceylon,

which is also caused by a species of *Nectria*. In all probability remedial measures similar to those undertaken in Ceylon, which consist in cutting out the diseased patch at as early a stage of development as possible, and protecting the wounded surface with tar or some available substance would prevent the spread of the disease. We are informed that the disease is not of a very serious nature and that but little injury to the tree follows. The tapping-knives, however, may frequently be broken should they come in contact with a canker, and no latex is obtained from the wounded portions of the trunk.

XVI.—THE HERBARIUM SAVATIER.

Otto Stapf.

Mme. L. Raoul, the daughter of the late Dr. P. A. L. Savatier, having offered the herbarium of her father to Kew for purchase, the whole of the collections included in that herbarium have been acquired for the Royal Botanic Gardens. They consist of two sets; one numbering 730 specimens comprises only Japanese plants, whilst the other, which numbers 735 specimens, is made up of several collections, mainly from Tahiti, Peru, the Straits of Magellan, and other parts of South America, under the general description "Campagne de la Magicienne."

The Japanese set is of particular interest and value, as it goes a long way to illustrate the "Enumeratio Plantarum in Japonia Sponte Crescentium," by Franchet and Savatier, the first comprehensive and methodical attempt at a flora of Japan on a scientific basis. Savatier's Tahiti plants were worked out and incorporated by Drake del Castillo in his "Flore de la Polynésie Française," and furnish therefore authenticated and important material for the study of the flora of Eastern Polynesia. The American plants, on the other hand, are only partly named, but as they are well localised, and like the rest, well preserved, they represent a valuable accession to the collections at Kew.

Dr. Paul-Amedée-Ludovic Savatier was born at Oléron (Charente Inférieure) on October 19, 1830. Educated at the Naval Medical School at Rochefort, he quickly rose to a distinguished position in the medical staff of the French Navy. In 1865 he accompanied, as medical officer, a mission of engineers to Japan which had for its object the building and organisation of a Japanese navy. During six out of the ten years he spent in Japan he was stationed at Yokosuka, to the south of Yokohama. Deeply interested in natural history he soon saw his opportunity, for though much had been written by European authors about Japanese plants, beyond Miquel's "Flora Japonica" (Catalogus Musei Lugduno-Batavi, I.)—a mere list of names, no comprehensive and methodical attempt at a flora of Japan had been made. On the other hand, the Japanese possessed by that time three profusely illustrated works on their flora (1) Kwa-wi (Collection of Plants), by Shimada Yonan, dated 1759; (2) Honzo Zufu

(Illustrated Treatise of Botany), by Iwasaki Tsunemasala, published 1828 ; and (3) Somoku Zusetzu (Illustrations and Descriptions of Plants), by Jinuma Yokusai, which appeared in 1856. Although the plants of the Somoku Zusetzu were arranged according to the Linnean system, and the Latin names were frequently given, there was no systematic collation of the Japanese plants, as figured in these works, and their vernaculars on one hand, with the scientific nomenclature of European botanists on the other. To achieve this object and to initiate Japanese botanists into the western systems of classification was Savatier's immediate aim. He made himself acquainted with the Japanese botanical literature and, together with his pupil Saba, translated the Kwa-wi (Paris, 1874), engaging a Japanese artist to delineate the plates, which were, unfortunately, never published. Last, but not least, he collected zealously in the neighbourhood of his station, and over a considerable part of Nipon, whilst European residents in various parts of Japan and Japanese collectors helped him by contributing plants. He himself is credited with having collected about 1,600 species, out of which over 100 were found to be new, or at least new to Japan. The results of his labours are displayed in the "Enumeratio Plantarum in Japonia Sponte Crescentium," which, under the joint authorship of A. Franchet and L. Savatier, appeared in two volumes (Paris, 1875 and 1879). The aim which Savatier had in view was fully realised by that work, which must have been of immense value to the Japanese in their endeavour to adjust their botanical taxonomy on a modern basis. The herbarium material which Savatier supplied directly and indirectly towards the elaboration of the " Enumeratio " was deposited in the Muséum d'Histoire Naturelle, at Paris, but he retained at the same time a large set for himself, and it is this which has now been acquired by Kew.

Having returned to France in 1876, Savatier was at once attached as " Médecin en chef " to the French Naval Division then about to leave for the Pacific, of which the flagship was the frigate " La Magicienne." Touching at the Cape Verd Islands and Montevideo, the division reached Punto Arena early in February of the following year. After a short stay in the Magelhan Straits (February 8 to 25), it proceeded to Valparaiso (March 9–20) and then to Callao (March 29 to April 29), whence Savatier made excursions into the interior as far as Oroyo. After a short stay at Ancon near Lima (April 29 to May 2), he went with " La Magicienne " to San Francisco and then to the Marquesas Archipelago where Nukahiwa was visited (August 14–20). After a prolonged cruise in the Pacific, Valparaiso was again reached early in 1878 (January 4 to March 19). Then followed a second visit to Callao (March 28 to April 25) with more excursions along the Andine railway and a visit to the Island of San Lorenzo off the port of Callao. After a short stay on the barren coast in the extreme north of Peru (Payta, April 28 to May 8), the division went once more to the French possessions in Eastern Polynesia, and it was then (June 20 to July 29) that Savatier made that collection of Tahiti plants of which he says that it included the greatest part of the flora of the island with the exception of the highest peaks. Early in 1879 (January 20 to February 7) we find him again in the

Magelhan Straits, this time homeward bound. A brief account of the voyage of "La Magicienne" by Savatier was published in Archives de Médecine Navale, vol. xxxiii (1880), pp. 5–35.

After a short service in Senegambia, Savatier retired as "médecin en chef de la marine," and died at Saint-Georges d'Oleron on August 27, 1891.

XVII.—MISCELLANEOUS NOTES.

The designation of the post of Principal Assistant in the Royal Botanic Gardens has been changed by authority of the Treasury to Assistant Keeper. Mr. G. Massee, F.L.S., hitherto a Principal Assistant in the Herbarium, and Mr. C. H. Wright, whose appointment as successor to Dr. Stapf was notified in *Kew Bulletin*, 1909, p. 24, will rank as Assistant Keepers.

The President of the Board of Agriculture and Fisheries has been pleased to appoint Mr. N. E. Brown, A.L.S., hitherto an Assistant in the Herbarium, and Mr. L. A. Boodle, F.L.S., hitherto Assistant in the Jodrell Laboratory, Assistant Keepers.

Mr. W. Dallimore, who entered Kew as a young gardener in 1891, and has since 1896 been Foreman in the Arboretum, has been appointed by the President of the Board of Agriculture and Fisheries an Assistant in the Museums.

Dr. F. E. Fritsch, who has filled with much acceptance the post of Lecturer in Physics and Chemistry at Kew since March 8, 1903, has found it necessary, owing to the pressure of other engagements, to resign this duty. Dr. P. Haas, Lecturer on Chemistry at St. Thomas's Hospital, has been appointed to succeed Dr. Fritsch.

We learn that Mr. J. B. Carruthers, F.L.S., formerly Assistant Director of the Royal Botanic Gardens, Ceylon, and subsequently Director of Agriculture in the Federated Malay States, has been appointed Assistant Director of the Department of Agriculture, Trinidad.

We also learn that Mr. F. A. Stockdale, B.A., F.L.S., since 1905 Mycologist and Lecturer in Agriculture to the Imperial Department of Agriculture for the West Indies (*K.B.*, 1905, p. 60), has been appointed Assistant Director of the Department of Science and Agriculture, and Government Botanist, British Guiana.

Botanical Magazine for March.—*Cycas Micholitzii*, Dyer, was introduced in 1904 from Annam by Messrs. F. Sander & Sons, through their collector Mr. W. Micholitz. The species, of which there are examples in the living collection at Kew, is remarkable

on account of the repeated dichotomy of the pinnules. The stems are more slender than is usual in the genus, and have a distinctly thickened base. *Saxifraga scardica*, Griseb., has been introduced from the Balkan Peninsula by Mr. R. Farrer, of Ingleborough, and a living plant, from which the drawing was prepared, has been presented by Mr. E. H. Jenkins, of Hampton Hill. At t. 8058 a variety was figured for which the name *S. scardica* var. *obtusa*, Sprague, is now proposed. It is the plant usually met with in cultivation, and differs from the type figured in this month's issue by having the lower leaves subacute, with 5–11 intramarginal pits, green 1–3-flowered stems, and green obtuse calyx-lobes, which are relatively free from pubescence. *Pseuderanthemum seticalyx*, Stapf, is an Acanthaceous plant from Tropical Africa, seeds having been sent to Kew by Mr. J. M. Purves, of the Forestry and Botanical Department, Nyasaland Protectorate. It is the *Eranthemum seticalyx*, C. B. Clarke, of the Flora of Tropical Africa, vol. v. p. 172. Its salver-shaped corollae have a slender pale red tube and a limb 1 in. across, cinnabar-red above, paler beneath. *Nigella integrifolia*, Regel, is a somewhat inconspicuous annual, which has been grown at Kew since 1894, when seeds were received from the Imperial Botanic Gardens, St. Petersburg. Flowering specimens were also received in 1907 from Mr. W. E. Gumbleton. Its small dark blue bell-shaped flowers resemble those of a *Campanula*. It is a native of Turkestan. The Japanese *Rubus Koehneanus*, Focke, was purchased from Mr. L. Späth, of Berlin, under the name of *R. moriifolius*, from which, however, it proves to be distinct. It forms a bush about 3 ft. high, and has fine lobed leaves and produces an abundance of pretty white flowers and orange-red fruits.

Flora Capensis.—The issue of the concluding part of the first section of Vol. IV. of this work, edited by Sir W. T. Thiselton-Dyer, has now to be recorded. The section includes 1168 pages, and has appeared in six parts, the dates of publication of which have been as follows :—

Part I., pp. 1–192,	was published	May, 1905.
Part II., pp. 193–336,	„	August, 1905.
Part III., pp. 337–480,	„	October, 1906.
Part IV., pp. 481–672,	„	November, 1907.
Part V., pp. 673–864,	„	March, 1908.
Part VI., pp. 865–end,	„	February, 1909.

The orders dealt with are Corollifloral, from Vacciniaceae to Gentiananceae.

The editor's preface, in which the history of the production of this very important volume has been given in detail, is reproduced below :—

As pointed out in the Preface to Section 2, the preparation of the preceding one, which is now completed, was delayed by unavoidable difficulties. It comprises two of the most important orders in the South African flora, the *Ericaceae* and *Asclepiadeae*, in both of which the specific characters require minute and therefore often lengthy description. The bulk of this section has grown accordingly, and it is actually equivalent to that of two ordinary volumes.

Dr. Harry Bolus, who has given such munificent encouragement to Botany in South Africa, kindly undertook the elaboration of *Ericaceae*, which for many years he had assiduously studied in the field. Professor Francis Guthrie, LL.B., B.A., who had long collaborated with Dr. Bolus, unhappily died on October 19, 1899. The elaboration of the intricate genus *Erica* is the result of their joint labours. The loss of his fellow-worker and his own indifferent health, compelled Dr. Bolus to abandon reluctantly proceeding with the remaining genera. These were undertaken by Mr. N. E. Brown, A.L.S., who, in working them out, found it necessary to establish some new ones, and in other respects to depart from the published key to the order. He has accordingly prepared a new one, which will be found in the "Additions and Corrections" at page 1123 of this Section.

Mr. N. E. Brown has also worked out the *Asclepiadeae* with immense pains. He has had the advantage of following Dr. R. Schlechter, an acute botanist who has few rivals as a collector. Both have been disposed perhaps to cut their species rather fine. But South African botanists in the future will find less difficulty in uniting species which cannot be sustained than in separating those which have been injudiciously united. Mr. Brown has himself been occupied with the study of the fascinating group of *Stapelieae*, both under cultivation and in the herbarium, for the past forty years, and it may be hoped therefore that his conclusions will have reached some finality. He has been led to the important result that many supposed native species have arisen from cross-fertilisation in European gardens. It is, however, a singular circumstance that some of the species which were the earliest described, and which cannot be accounted for in this way, have never been met with again by subsequent collectors. It is to be feared that one of the most striking features of the South African flora is doomed to gradual and irremediable extinction.

Mr. W. P. Hiern, F.R.S., who is the acknowledged authority on the order, has undertaken the *Ebenaceae*. In his monograph published in 1873 he had already taken up two species of *Royena* left by the late Professor Harvey in manuscript.

For some of the smaller orders it has also been possible to make use of Harvey's work. It is somewhat remarkable that two species of *Jasminum* of which he left descriptions have remained since 1865 unanticipated in publication by any other describer.

Dr. Stapf, F.R.S., has elaborated the *Apocynaceae*.

Lieut.-Colonel Prain, C.I.E., F.R.S., the Director of the Royal Botanic Gardens, has undertaken *Loganiaceae* with Major H. A. Cummins, C.M.G., and *Gentianeae* with Mr. A. W. Hill, the Assistant-Director.

For the limits of the regions under which the localities are cited in which the species have been found to occur, reference may be made to the Preface to Vol. VI.

I continue to be indebted for invaluable aid to Mr. C. H. Wright, A.L.S., now Assistant Keeper, and to Mr. N. E. Brown, A.L.S., Assistant in the Herbarium of the Royal Botanic Gardens, the former in reading the proofs, and the latter in working out the geographical distribution.

Besides the maps already cited in the Prefaces to Volumes VI. and VII., the following have also been used :—

Map of the Colony of the Cape of Good Hope and neighbouring territories. Compiled from the best available information. By John Templer Horne, Surveyor-General. 1895.

Stanford's new map of the Orange Free State and the southern part of the South African Republic, &c. 1899.

Carte du Théâtre de la Guerre Sud-Africaine. Par le Colonel Camille Favre. 1902.

To many of the South African correspondents of Kew enumerated in previously published volumes I have again to tender my acknowledgments for the contribution of specimens in aid of the work to the Herbarium of the Royal Botanic Gardens.

I must further record my obligations to some new contributors, and to those whose kind assistance in various ways has been of the greatest value in the preparation of this section of Volume IV.

Harry Bolus, Esq., D.Sc., F.L.S., has continued his generous gifts of specimens, besides lending others from his herbarium of *Asclepiadeae* and *Gentianeae*, including many types of Dr. Schlechter's species.

Dr. John Briquet, Director of the Botanic Garden, Geneva. Loan of specimens from the Delessert Herbarium.

Paul Conrath, Esq. Plants from the Transvaal.

Joseph Burtt Davy, F.L.S., Government Agrostologist and Botanist, Transvaal. Plants from the Transvaal.

Dr. Casimir de Candolle, Geneva. Photograph and loan of specimen from the Candollean Herbarium.

Geheimrath Dr. A. Engler, Director of the Botanic Garden and Museum, Berlin. Loan of *Gentianeae*.

Dr. H. O. Juel, Director of the Botanic Garden, Upsala. Loan of portions of Thunberg's herbarium.

Prof. Paul Henri Lecomte, Jardin des Plantes, Paris. Photographs of Lamarck's types of *Chironia*.

Miss R. Leendertz. Plants from the Transvaal.

Dr. H. W. C. Lenz, Director of the Museum, Lubeck. Loan of E. Meyer's types of *Asclepiadeae* and *Gentianeae*.

Dr. C. A. M. Lindman. Loan of specimen of *Chironia* from the herbarium of P. J. Bergius, Stockholm.

Dr. John P. Lotsy, Director of the Royal Herbarium, Leiden. Loan of specimens of *Gentianeae*.

Dr. Rudolph Marloth, Capetown. *Stapelieae*, living and in fluid.

Miss A. Pegler. Plants from the Transkei.

Dr. G. Albert Peter, Director of the Botanic Garden, Gottingen. Loan of specimens of *Gentianeae*.

N. S. Pillans, Capetown. Large collection of *Stapelieae*, living and in fluid, including many new species, and the loan of his large and valuable herbarium of the group. The generous aid of this enthusiastic collector and the free use of his copious notes have been of the greatest value in the difficult task of working out the species.

Humphrey John Sankey, Esq. Plants from the vicinity of Harrismith, Orange River Colony.

Dr. Hans Schinz, Director of the Botanic Garden and Museum, Zürich. Numerous specimens collected by Dr. R. Schlechter; loan of *Gentianeae*.

Dr. Selmar Schönland, Curator of the Albany Museum, Grahamstown. Small collection of *Asclepiadeae* and loan of *Gentianeae*.

Prof. Albert Charles Seward, F.R.S. Loan of *Gentianeae* from the University Museum, Cambridge.

Miss Ethel West. Plants from Port Elizabeth.

John Medley Wood, A.L.S., Director of the Botanic Gardens, Durban. Numerous specimens of *Asclepiadeae* and loan of *Gentianeae*.

Prof. E. Perceval Wright, Sec. R.I.A., Keeper of the Herbarium, University of Dublin. Loan of portions of Harvey's herbarium.

Dr. Alexander Zahlbruckner, Keeper of the Botanical Collections of the Naturhistorische Hofmuseum, Vienna. Loan of specimens of *Asclepiadeae* and *Gentianeae*.

On this occasion it is appropriate to pay a brief tribute to the memory of Sir Henry Barkly, G.C.M.G., K.C.B., F.R.S., who died on October 21, 1898. It was at his instance that during his last period of official life as Governor of Cape Colony (1873–7) the preparation of the *Flora Capensis* was resumed, and it was due to his support that the approval and aid of the Legislature of Cape Colony and Natal were secured. He was deeply interested in the *Stapelieae*, of which at the time the study had been comparatively neglected. He collected and cultivated as many as he could, and also sent a large living collection to Kew. Lady Barkly and Miss E. B. Barkly made water-colour drawings of them as they flowered. Of these copies were sent to Kew, together with specimens in alcohol, accompanied by copious descriptive notes. An account of this material was published in Hooker's *Icones Plantarum*, tt. 1901–25; and coloured figures of four of the species that flowered at Kew appeared in the *Botanical Magazine*. The whole of Sir Henry Barkly's material was a contribution to the study and elaboration of the group only second perhaps in value to that of Mr. Pillans.

I may be permitted more personally to express my indebtedness to Lieut.-Colonel Prain for kind and unfailing assistance in many ways, without which the task of editing a work of this kind at a distance from the resources of Kew would be one of peculiar difficulty.

The critics of niceties of nomenclature, which often seem to obscure the interest of larger problems, will probably notice that the Kew tradition has been adhered to, and the supposed right of priority of the original specific epithet has been disregarded where an existing name is available which has correctly placed a species in the genus to which its affinity is most obvious. The principle was laid down by Sir Joseph Hooker in 1872 in *The Flora of British India*. Its justification is based on technical grounds equally with those of common sense. It may be convenient to briefly state them :—

i. The so-called binominal nomenclature which we employ was devised by Linnæus, and, as with everything he did, on a logical and definite basis. Nothing but confusion can arise by departure

from this. To the specific epithet, apart from its proper function, Linnæus attached no importance at all. He saw that the scientific problem was to get the species into its right genus. "Nomen specificum sine generico est quasi pistillum sine campana." The specific name taken alone is the clapper without the bell. A Linnean name, then, though it consists of two parts, must be treated as a whole. "Nomen omne plantarum constabit nomine generico et specifico." And the same principle obviously applies to all names constructed in accordance with Linnean rules. The supposed appeal to justice begins by repudiating the authority of the lawgiver. Alphonse de Candolle appreciated the true position when he said: "The real merit of Linnæus has been to combine, for all plants, the generic name with the specific epithet."

ii. But the claim for justice works the greatest injustice, and it is not even tempered with mercy. Any careless or incompetent botanist can tack on a blundering name to an undescribed plant, and his blunder with his name attached is to be handed down to posterity for all time. As Linnæus saw, the real scientific feat is to discover its true affinity, not to give it a haphazard label. And the author who does this successfully is the one whose insight deserves commemoration. It is impossible not to agree with Sir Joseph Hooker when he says: "I regard the naturalist who puts a described plant into its proper position in regard to its allies as rendering a greater service to science than its describer when he either puts it into a wrong place or throws it into any of those chaotic heaps, miscalled genera, with which systematic works still abound."

iii. Every revision of the contents of an order involves a reconsideration of the mutual affinities of its contents, and this usually involves some transposition of species from one genus to another, or the creation of new genera. It may be hoped that the process is generally judiciously accomplished. But in any case it yields a crop of synonyms. This is inevitable, and these in a work like the present have to be examined and quoted. The labour involved will be evident from many of its pages. There is said to be a species of *Fimbristylis* with 135 synonyms. Taxonomic science must in the end be crushed by its own literary top-hamper. The only remedy eventually will be to draw a line behind which synonymy will be ignored. But we need not add to the burden by the creation of a new specific name when one which is valid and available already exists in the genus. The appeal to justice lays itself open in such cases to the suspicion of being little more than a cloak for the vanity of the author.

I have equally resisted the wholesale manufacture of new specific names by the revival of obsolete or forgotten genera without any obvious necessity. Nomenclature is a mere means to an end; it is ignominious to become its slave, and we alienate the sympathy of the public, which we wish to secure, by changes of familiar names which, to its eyes, must seem simply wanton.

The expenses of preparation and publication of the present section of Volume IV. have been aided by grants from the Governments of Cape Colony and Natal. The Government of the Transvaal has not hitherto been associated with the work. It

is a gratifying evidence of the appreciation of its usefulness in South Africa that that Government has now spontaneously also made a grant in aid of its publication.

A Substitute for Lignum Vitae.—In the *Indian Forester* for December, 1908, p. 717, a short account is given of a substitute for the Lignum Vitae (*Guiacum officinale*, L.) of the West Indies. The new wood is called Mancono (*Xanthostemon Verdugonianus*, Naves) and is found in considerable abundance in north-eastern Mindanao, Philippine Islands.

The wood is said to be so heavy and hard that it is difficult to cut and the splitting of a log is almost impossible. According to Mr. Dunlap of the Bureau of Forestry for the Philippine Islands it grows along steep slopes near beaches, whence it can be shipped by water transportation, and as it is only required for use in short lengths the work can all be done in the forests. The wood of the Mancono tree even in the Tropics is practically indestructible and is not attacked by white ants. Many of the Filipinos of the Southern Islands use the logs for posts and ground timbers.

The heartwood of the tree is uniformly reddish-black, but after a number of years of seasoning it turns a black walnut colour. Like all Philippine hardwoods it takes a fine polish.

The wood is of such density that it sinks in water, so that the logs have to be rafted between native boats to keep them on the surface of the water when being taken to the steamer.

The wood has been used as a substitute for Lignum Vitae at the United States Naval Station, Cavite, P.I., and has been pronounced a success after a year's trial. It has also been satisfactorily tested in the shipyard of the Bureau of Navigation, Manila.

Remedies for Snake Bite.—Specimens of two plants collected by Mr. E. St. J. Lawson, the head of the Police in Siam were forwarded to Kew by his brother Dr. Arnold Lawson, F.R.C.S., together with a letter and report in which it is stated that the plants are very efficacious in the cure of snake bites in Siam. The plants proved to be *Barleria Prionitis*, Linn. and *Justicia Gendarussa*, Linn. f.

In his letter Mr. E. St. J. Lawson says of the two plants, the first [*Barleria Prionitis*] appears to have remarkable qualities in curing persons bitten by cobras, and the second [*Justicia Gendarussa*] is alleged to be still more efficacious . . . ."

Dr. Arnold Lawson has permitted us to publish his brother's report on an interesting case of snake bite in which it is mentioned that a decoction of the *Barleria* was frequently used and found efficacious, though it does not appear to have been able to avert death in the case of the bite of a hamadryad though death was delayed for a considerable time.

The report with a few omissions and verbal alterations is as follows :—

"Nai No, a labourer, aged 26, lived in Bantawai . . . . with his adopted mother Amdeng Chan in Bantawai.

"He has for many years amused himself with snake-charming and snake-training, but did this for a hobby and not as a trade.

"During the past three years has been bitten by cobras at least ten times, but has always cured himself by taking the medicine he kept for the purpose.

"On 30th September, being a holiday, Nai No went out and returned later in the day with two hamadryads (king cobras) that he had caught. Length about 7 feet each.

"On October 3rd at 6 p.m. Nai No took these two snakes out of the jar in which he kept them . . . . and began to play with them, holding one in each hand. One of the snakes got angry and bit Nai No on the right arm above the wrist. He then put the snakes away and took his usual medicine but it did not have its usual effect. Three minutes after taking the dose of medicine he vomited. Five minutes later he took a second dose which he retained. At 2 a.m. he vomited again and then took more medicine. At 11 a.m., October 4th, he vomited again and wished to take more medicine but was unable to swallow.

"He then instructed his adopted mother to fetch more of the plant from which the medicine is made and to make up a fresh dose telling her where to find the plant. She did according to his instructions and bringing the plant to him prepared it according to his instructions. She then gave the preparation to him but he had spasms in his throat and could swallow nothing.

"Nai No died about 1 p.m.

"The corpse and snakes were sent to Police-Surgeon Dr. Fysche who certified that death was from snake-bite . . . ."

MEMORANDUM.

"The fact that Nai No had been frequently bitten by cobras and had cured himself every time is about as well established as anything resting on such essentially weak evidence as is all human testimony can be. It may be argued that the snakes were not cobras. The only reply is that people accustomed to cobras say they were, and there is not the least reason to believe that the witnesses are not stating what they believe true. Leaving, however, the past aside we have this absolute certainty Nai No was bitten by a hamadryad (king cobra) at 6 p.m. on October 3rd, and did not die until 1 p.m. on October 4th. The bite of the hamadryad is regarded as at least as dangerous (most people regard it as more rapidly fatal) as the bite of the cobra.

In my long experience of nearly 18 years during which time literally thousands of enquiries regarding death from cobra bite have come before me I cannot recall a single instance in which the person bitten survived more than two hours. In the vast majority of cases death occurred within 30 minutes of being bitten.

The medicine used by Nai No is prepared as follows :—

The leaves and twigs of a plant named in Siamese 'Salate phang poru' are pounded in shamshoo (rice spirit). The liquid is taken internally and the solid left after pounding is placed on the wound. The medicine must be taken immediately after being bitten. I have been unable to discover any European name for 'Salate phang

poru.' It is a rare plant. I am sending by this mail the dried leaves and twigs of this plant. They are marked A. and are the twigs with thorns. [*Barleria Prionitis.*]

In a separate box are sent leaves and twigs of another plant alleged to be more efficacious and still rarer, but of this I have no reliable proof. This appears to have no name in any language. [*Justicia Gendarussa.*]

Nai No used 'Salate phang poru.' I can get no reliable data as to proportions used."

(Signed) ERIC ST. J. LAWSON.

18/10/08

In a subsequent letter to his brother, dated February 22, 1909, Mr. E. St. J. Lawson says :—

"The Siamese say that *Justicia* is the female of *Barleria*, and the latter never has flowers or fruit, and the former has flowers only but no fruit. I suppose this is nonsense, but I cannot get any flowers of *Barleria* or fruit of *Justicia*. I have gone into the matter more fully since my last letter, and I find that the efficacy of the medicine is generally believed in. Indeed, a man who has been in my service many years has been bitten by what he says was a cobra, took this medicine and recovered ; is perfectly fit at this moment, in fact. As I did not see the snake myself, I am not prepared to express an opinion on this case. As likely as not it was a water-snake or other harmless snake, such being infinitely more numerous than cobras. This, however, in no way applies to the case of Nai No, who most certainly was bitten by a hamadryad. . . . What I refer to as *Barleria Prionitis* is what is known here as 'Salate phang poru.' *Justicia Gendarussa* has no name at all in Siam, as far as I can discover."

There appears to be no record at Kew, nor has any reference been found, as to the use of these plants as antidotes for snake bites, and the interest of Mr. Lawson's communications lies in the evidence they afford that a belief in the efficacy of these two plants prevails among certain classes of Siamese.

According to Watt (Dict. Econ. Prod. Ind.) "the seeds of *Barleria cristata*, Linn., are supposed to be an antidote for snake bite, and the roots and leaves are used to reduce swellings."

Green Ginger.—A query was addressed to Kew by Mr. W. Stevenson of Alfreton as to the nature of the ginger root "which was grown by the peasantry in the later middle ages as 'green ginger.'" In the letter on the subject it is mentioned that "In Hull, adjoining what was known as the gardens of the Great Manor House of the De la Poles, is a short street called 'Land of Green Ginger.'"

Professor Vinogradoff, in his work on "Villainage in England," p. 290, says : "Trifling rents, consisting of flowers or roots of ginger, were sometimes imposed with the object of testifying to the Lord's seignory," and in the Warwickshire Hundred Roll is to be found "per servicium unius radicis gyngibri . . . unius rose."

Mr. W. J. Corbett, Bursar of King's College, Cambridge, informs us that rent was occasionally paid in ginger. "In the

reign of Edward I. a holding of 9 acres at Skipwith, a hamlet of Kirkland in Cumberland, near Cross Fell, paid yearly '1 racinus' of ginger, but that this is all on a par with the still more common practice of demanding a peppercorn rent or a rent in cloves, and that the ginger was bought at a local fair and not grown."

The radix gyngibri was very probably the true ginger, but the green ginger of the Land of Green Ginger refers to *Artemisia vulgaris* (and other aromatic herbs) according to J. F. Robinson, Flora of the East Riding of Yorkshire, p. 128. The name also occurs in Lincoln for *Artemisia vulgaris* (*see* Britten and Holland, Dictionary of English plant names, p. 541).

According to Murray's Oxford English Dictionary green-ginger is the undried root, usually in preserve.

Botanical Journey in the Malay Peninsula.—The following extracts from a letter dated December 18, 1908, addressed to Sir J. D. Hooker, O.M., G.C.S.I., by Mr. H. N. Ridley, F.R.S., are by permission printed here on account of their great general interest:—

"I have just returned from an expedition to Perak and Pahang, where I have collected such interesting additions to our flora as *Sarcopyramis*, *Sanicula*, *Disporum*, besides a number of new species and one or two new genera. I got three Balsams, one very fine thing of which I have only seen scraps before, the Golden-flowered Balsam; the flowers nearly two inches across, and like those of an *Oncidium*, hence I would name it *oncidioides* [*see K.B.*, 1909, p. 11]. I hope to get it alive to Kew next spring; I have plants and seeds which are germinating; the flowers are racemose. The second species much resembles *Griffithii*, but has rather different foliage. The third I have not yet properly examined; it looks like *platypetala*.

"Wray had had specimens of the Golden Balsam, which were sent to me as Gesneraceous, so you may judge how poor they were, and I sent you a scrap, brought me by an amateur, which was quite unidentifiable. It is really a beautiful thing; I drew up description and rough sketch of details in camp.

"As to the rest of the collections, it was very curious to note that directly we passed over the ridge which politically divides Perak from Pahang, though not a bit more striking than any other ridge we crossed, the flora completely changed, and all the Himalo-Javanese things appeared across the border: *Sarcopyramis*, *Viola*, *Disporum*, *Sanicula*, &c., and the zoologists say all the birds there are Himalayan. I am preparing an account of these plants."

Mr. Ridley's detailed account of this journey will be eagerly anticipated.

Materials for a Flora of the Malayan Peninsula.—The appearance of Part 21 of this work by Sir George King and Mr. J. S. Gamble, has coincided almost to a day with the lamented death of Sir George, who himself prepared the first thirteen parts—to the end of the *Calyciflorae*, and with whom Mr. Gamble has been associated in elaborating the *Corolliflorae*. Part 21 which completes the

Corolliflorae contains two families; the *Gesneraceae*, prepared by Mr. H. N. Ridley, F.R.S.—already published in the *Journal of the Straits Branch of the Royal Asiatic Society* for 1905, and the *Verbenaceae*, prepared by Mr. Gamble. The original account of the *Gesneraceae* not being quite in the form adopted throughout the *Materials* as published by the *Asiatic Society of Bengal*, has, with Mr. Ridley's sanction, been re-edited. Only the necessary formal alterations have been made, but Mr. Ridley has taken this opportunity to supply a few notes and to make several additions, including descriptions of three new species, one of which is the type of a new genus. The number of species of this order now described is 131, belonging to 20 genera. The number of species described under *Verbenaceae* is 72, belonging to 15 genera; 16 of the species are new to science. Sir George King was able to examine the sheets of this part as they passed through the press, but this was the only share in its publication that the state of his health permitted him to take. While the various parts included in the *Corolliflorae* were under preparation by Sir George King and Mr. Gamble, Mr. H. N. Ridley undertook the elaboration of the Monocotyledonous families, under the same general title as that originally adopted by Sir George. The appearance of the first part of Mr. Ridley's contribution to this great undertaking was noticed in *Kew Bulletin*, 1907, p. 410. Since then Mr. Ridley has published two more parts completing the Monocotyledons, so that with the account of the Incompletae, on which Mr. Gamble is at present engaged, the task initiated by Sir George King in 1889 will be completed.

Stone Seat in Kew Arboretum.—Enquiries are from time to time made as to the stone seat among the beech trees towards the southern end of the gardens. The seat, which was placed in the position it occupies in February, 1904, was presented to Kew by a group of friends of the late Miss Cassell, who was for twenty years Lady Superintendent of the College for Working Women. It was provided as a memorial by past and present students of the college, to express their sense of Miss Cassell's unique personality. "That it should be a resting-place in sight of sky and trees in such an altogether beautiful place as Kew, and within reach of working Londoners, seems, in accordance with her life spent in working for the working poor, what she would like," is a sentence which occurs in a letter on the subject, written by Mrs. Maclehose, at whose instance the memorial was erected, to her brother, Mr. G. Macmillan. In the same letter Mrs. Maclehose says:—"We should like some motto or words carved on it, but no obviously memorial words—no names." The actual inscription is:—

LIFE—THE GIFT

LET US TAKE HANDS AND HELP THIS DAY WE ARE ALIVE TOGETHER

LOOK UP ON HIGH AND THANK THE GOD OF ALL